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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

EDISON, NEW JERSEY 08837

September 18, 1987

MEMORANDUM

SUBJECT: SAAD Waste Oil Geotechnical Investigation Draft Report

FROM: George R. Prince, Environmental Scientist
Environmental Impact Section
Environmental Response Branch

TO: Greg Powell, OSC
EPA, Region IV

I have attached a copy of a draft report from our EERU contractor covering the drilling program we conducted at the SAAD waste oil site in Nashville, TN. This report will probably remain in draft from as our current contract has expired.

We garnered a significant amount of information from our investigations at the SAAD site. Most of this information is included in this report, but may further require some explanation. We should get together at your convenience to discuss our past efforts and evaluate future needs for removal actions at this site.

Call me if you have any questions at FTS 340-6649.

Attachment

call on 3/29/88

~~3rd~~ week of April — maybe
4th

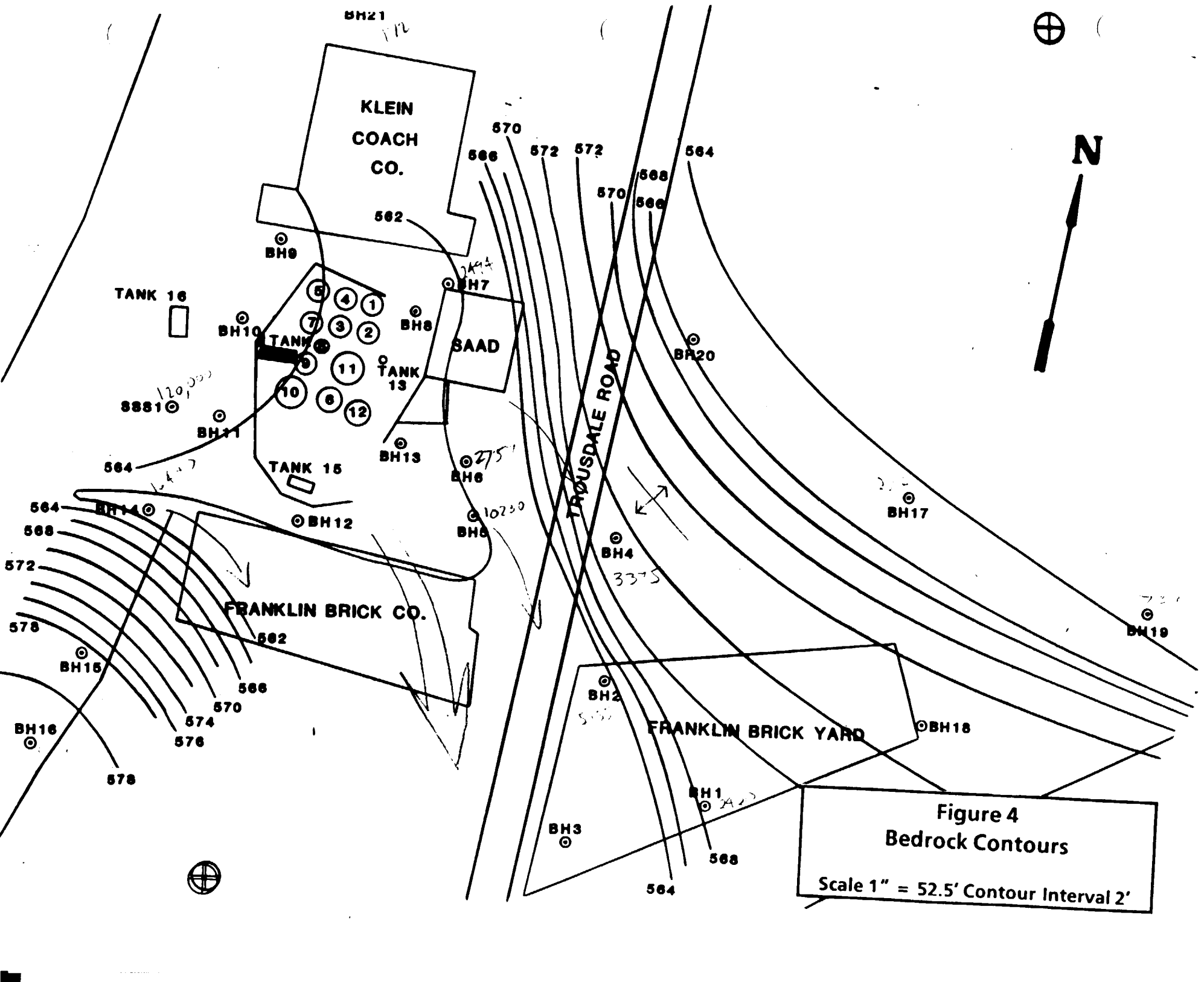
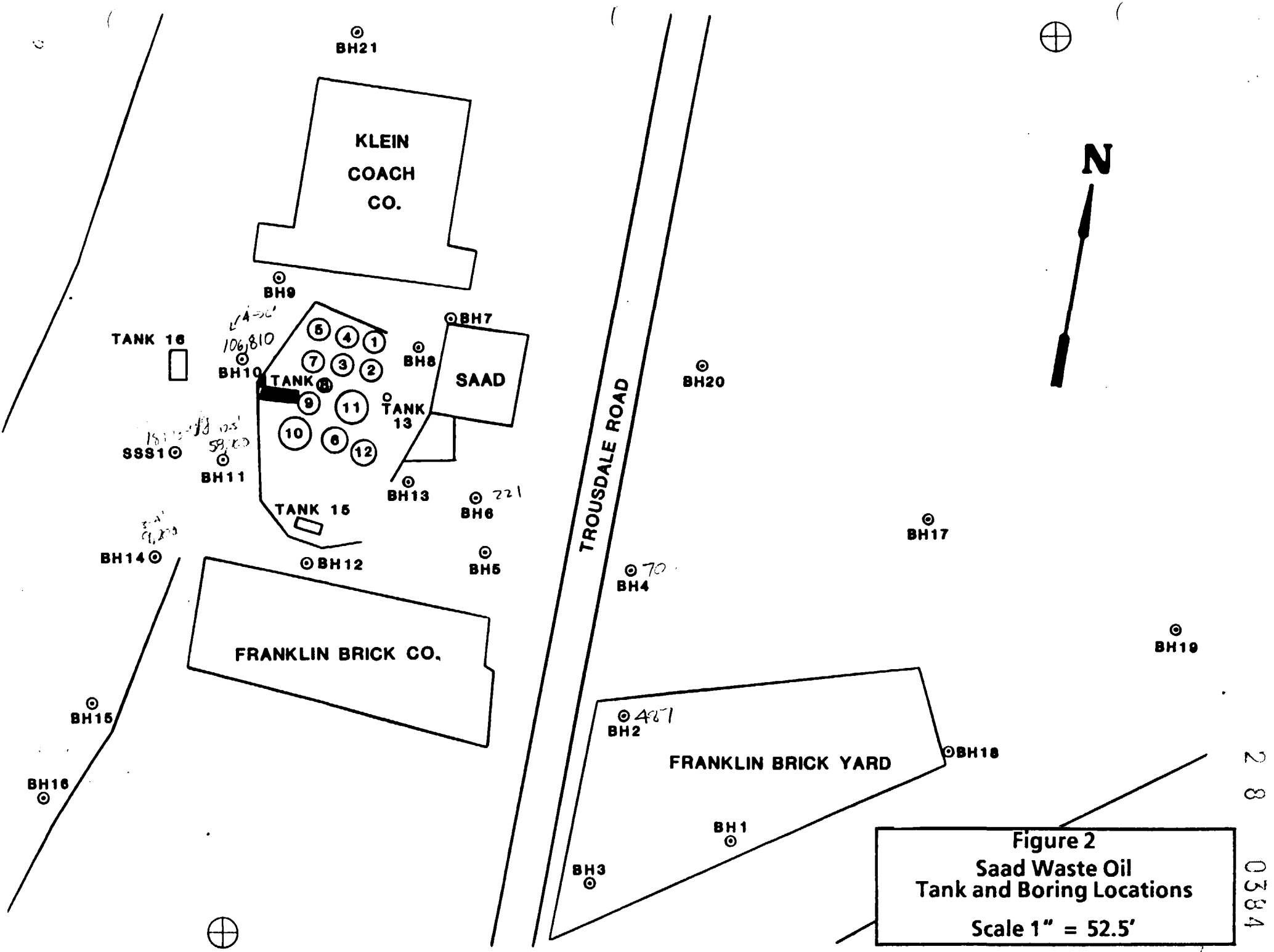


Figure 4
Bedrock Contours

Scale 1" = 52.5' Contour Interval 2'



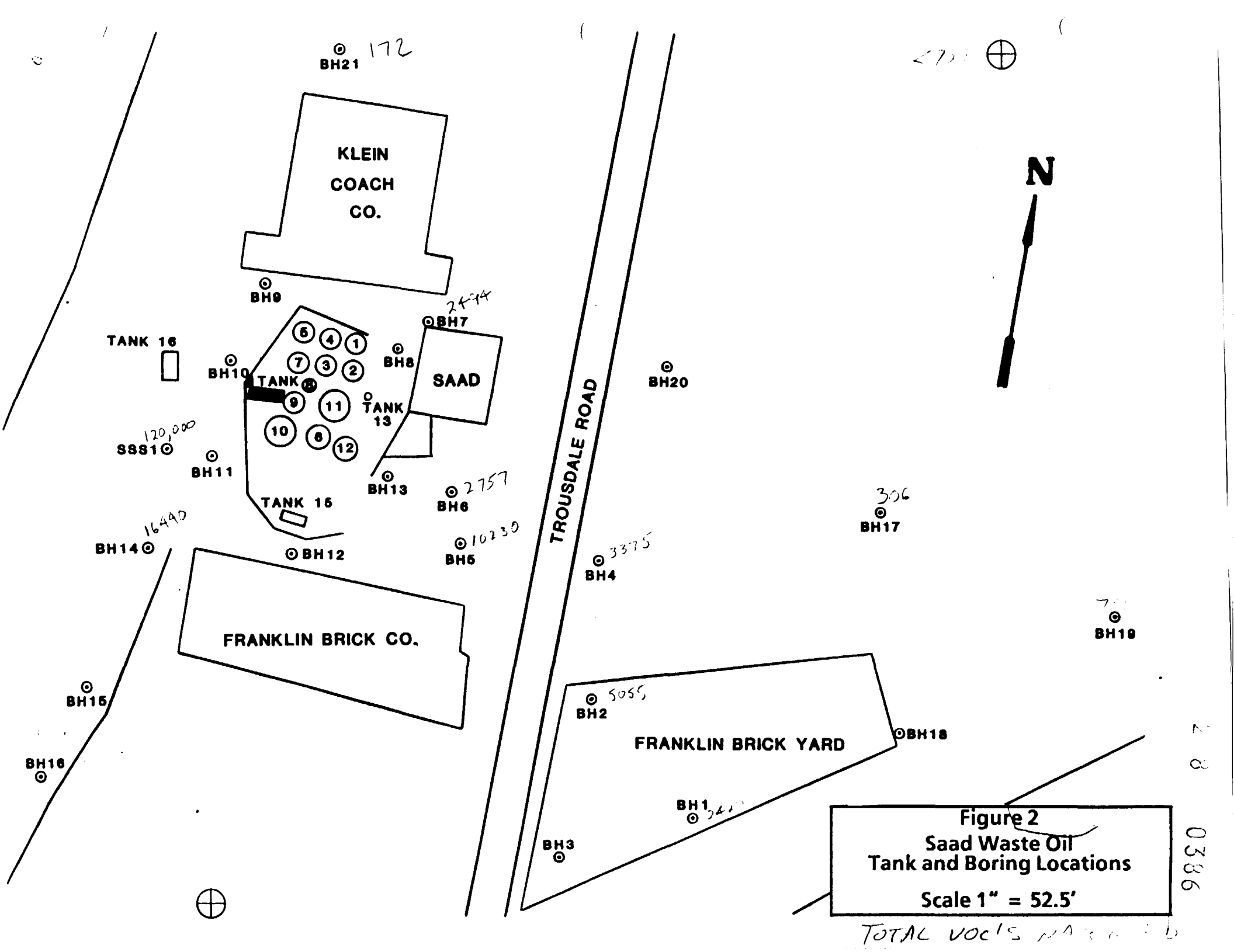
TOTAL VOC's

0384

TABLE 7
VOLATILE ORGANICS AND PESTICIDES/PCB'S IN WATER
Concentrations Reported In ug/L

Parameter	Borehole No./Date									
	B-1 3/23/87	B-2 3/23/87	B-4 3/23/87	B-5 3/23/87	B-6 3/23/87	B-7 3/26/87	B-14 3/26/87	B-17 3/23/87	B-19 3/23/87	B-21 3/25/87
Lab Sample No.	5710	5709	5707	5705	5706	5715	5714	5708	5711	5713
Methylene Chloride				200*		53*	2500			1*
Trans-1,2-Dichloroethane	63		420	1200	1900	1800	4100	270	560	14
Chloroethane										13
Toluene	88	4000	1100	7500	360	210	4100			
Total xylenes	1900	880	1500	1100*	150*		310			9
Acetone										68
Chloroform										
Ethyl benzene	220	120*	180				110*			
2 Butanone										9*
4 Methyl-2-pentanone							210*			
Benzene	7*	55*								
1,1 Dichloroethane	78		55	120*	67*	81*	110*	14	39*	33
1,1,1-Trichloroethane										8
Trichloroethene							5000			
Vinyl chloride	64		120		280	350		22	140	18
Carbon disulfide				110*						
Pesticides/PCB's	ND	ND		ND	ND	ND	ND	ND	ND	ND
4,4 - DDT			.56							

ND - None Detected
*Denotes a value below the limit of quantification that is considered approximate


BH21
172
KLEIN
COACH
CO.
BH9
2494
BH7
TANK 16
BH10
BH8
SAAD
TANK
TANK
13
BH20
120,000
SS1
BH11
2757
BH13
BH6
TANK 15
306
BH17
16490
BH14
BH12
10230
BH5
TROUSDALE ROAD
3375
BH4
N
BH19
FRANKLIN BRICK CO.
BH15
5055
BH2
BH18
FRANKLIN BRICK YARD
BH16
BH1
BH3
Figure 2
Saad Waste Oil
Tank and Boring Locations
Scale 1" = 52.5'
TOTAL VOC'S
0386

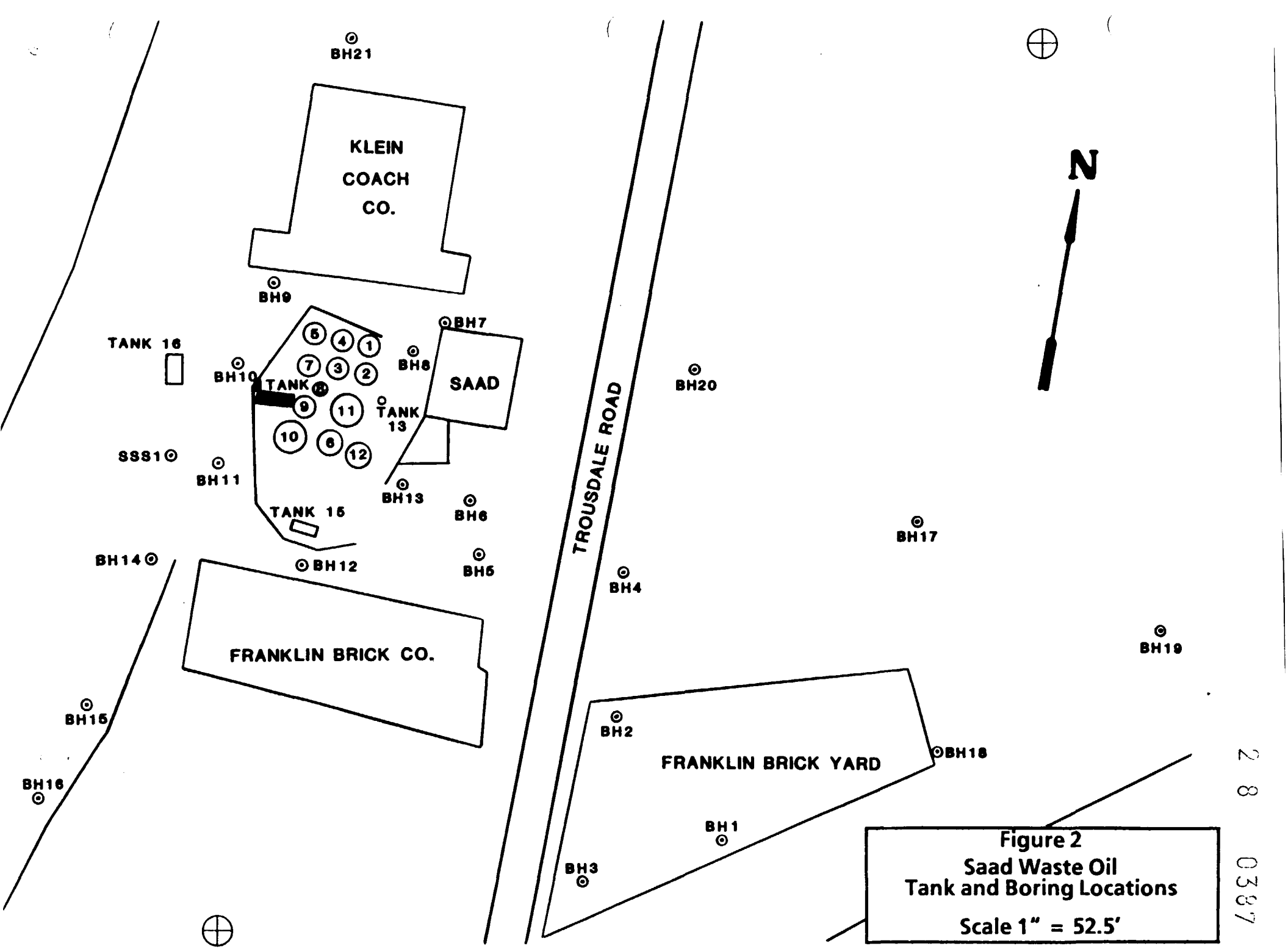


Figure 2
Saad Waste Oil
Tank and Boring Locations

Scale 1" = 52.5'

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VOLATILE ORGANICS AN PESTICIDE PCB'S IN SOIL
Concentrations Reported In ug/kg

Parameter	Borehole/Depth										
	B-2 6.0'-7.5'	B-4 4.0'-5.0'	B-6 10.0'-13.0'	B-10 4.5'-6.0'	B-11 12.5'	B-11 14.0'	B-11 16.0'	B-14 3.0'-4.1'	B-18 6.5'-8.5'	B-18 6.5'-8.5' Duplicate	SSS1 (Oil) (ug/g)
Lab Sample No.	B-2, 5-5	B-4, 4'-5'	B-8,R-1,10-13	B-13,4.5-6	B-16,R-1,2.5	B-16,R-1,14	B-16,R-2,BOB	B-20,3-4.1	B-24, R-1, 6.5'-8.5'	B-24,R-1 6.5'-8.5'	7334
Methylene Chloride			16	950					38*		670
Trans-1,2-Dichloroethane	2*		8*	13,000							
2-Hexanone			23*						270		
Toluene			54	29,000	53,000	100	3*	3,900			1300
Total xylenes	330	590	120	9,800		23		3,700			
Acetone	22			1,200*	1,100*	340	800	810*			
Chlorobenzene											
Ethyl benzene	95	110		2,200*	4,600	7*		610*	380		230
2 Butanone						71	96				
4 Methyl-2-pentanone	33			530*		38	49				
Benzene	5*										
1,1 Dichloroethane				18,000						19*	130
1,1,1-Trichloroethane				28,000							1700
Trichloroethene				930							4800
Tetrochloroethene				3,200							4800
Vinyl chloride											290
Trans-1,2-dichloroethylene											4200
Pesticides/PCB's (ug/g)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1242 (ug/l)											36
Aroclor 1260 (ug/l)											17

ND - None Detected
*Denotes a value below the limit of quantification that is considered approximate

TABLE 8
OFF-SITE GROUNDWATER

Parameter	Sample									
	Croft Spring	Croft Spring	Croft Spring	Saad Monitoring Well	Saad Monitoring Well 9/87	Well #1 9/87	Well #2	Well #2 9/87	Well #3	Well #3 9/87
Lab Sample No.	SS-S-7-W	SS-CF-SP	7333	SS-SS-MW7	3334	7331	SS-CF-MG2	7332	SS-CF-MW3	7353
Sampling Program			3/87		3/87	3/87		3/87		3/87
1,1 Dichloroethane	2J	ND	ND	1,100	1,700		ND	ND	ND	ND
Chloroform	0.5J			11						
Chlorobenzene	2J									
Vinyl Chloride				6,600	9,800					
Methylene Chloride				19,000	5,500					
1,1 Dichloroethene				690						
Chloroethane				240						
Trans-1,2-Dichloroethane				95,000	52,000					
1,2 Dichloroethane				31						
1,1,1-Trichloroethane				15,000	6,300					
Trichloroethene				69,000	30,000	<5				
Benzene				67						
Tetrachloroethene				49,000	9,600					
Toluene				3,900	4,600					
Chlorobenzene				87						
Ethyl benzene				310	500					

ND - No VOA's detected in analysis

J - Estimated Value

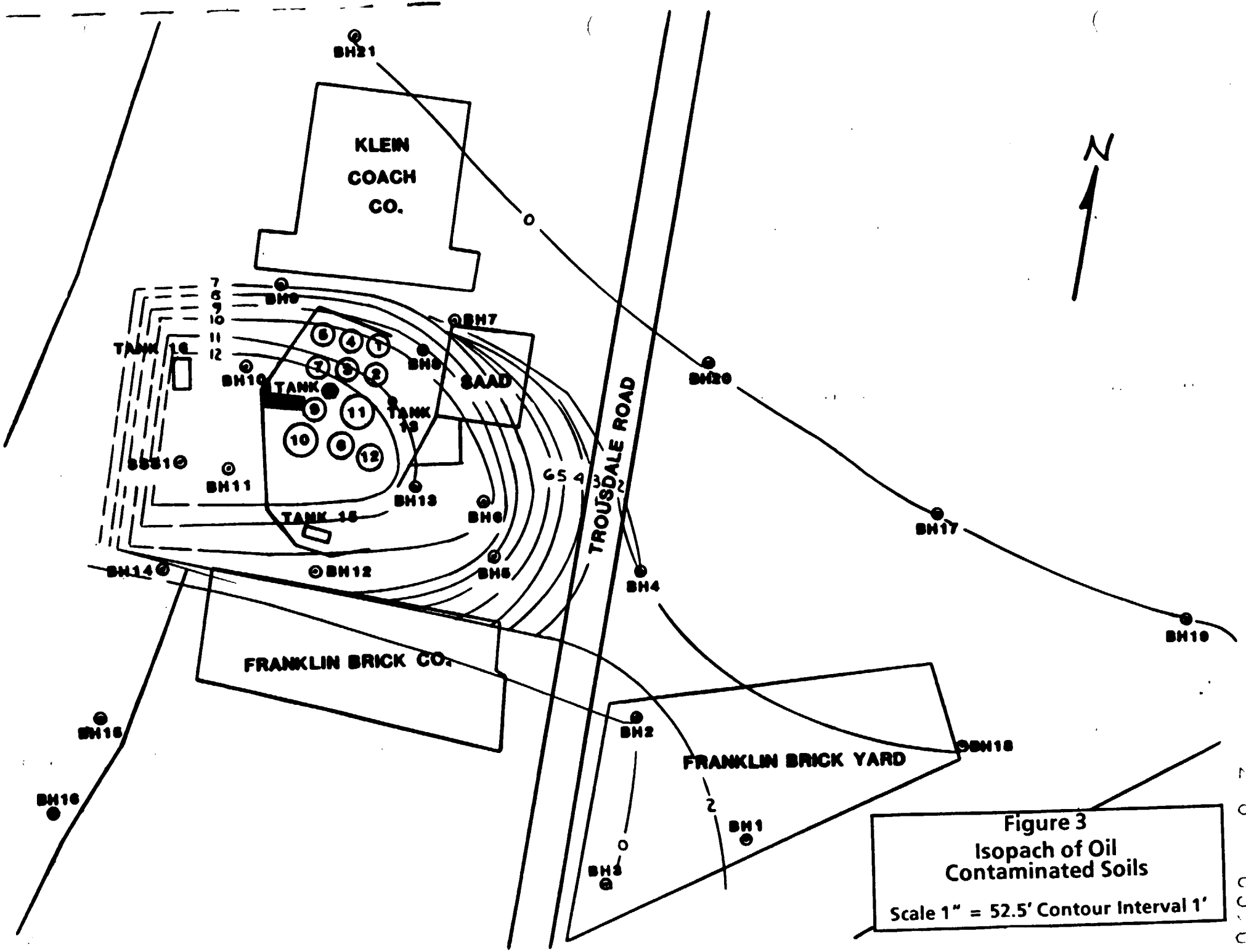


Figure 3
Isopach of Oil Contaminated Soils

Scale 1" = 52.5' Contour Interval 1'

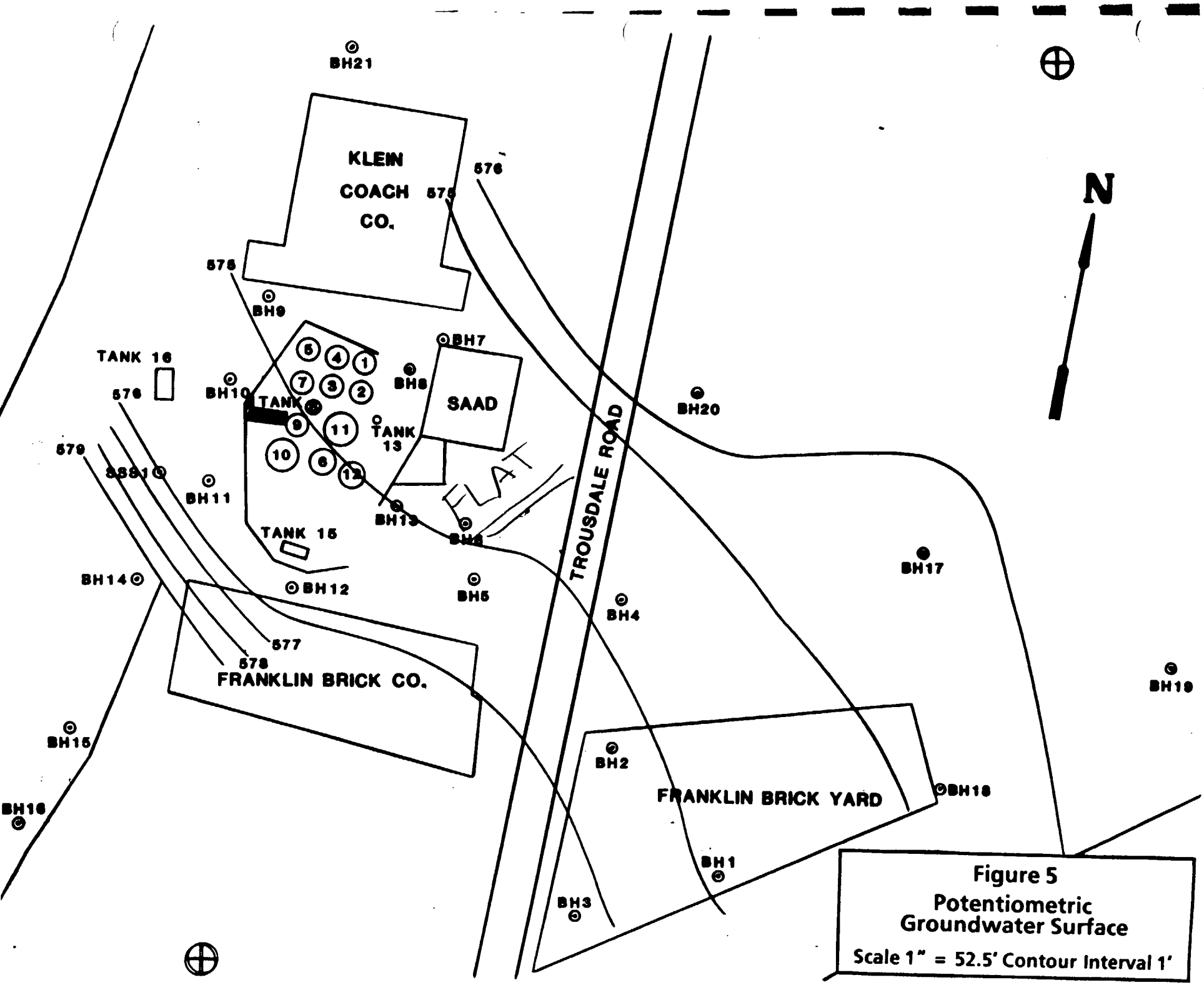


Figure 5
Potentiometric Groundwater Surface
Scale 1" = 52.5' Contour Interval 1'

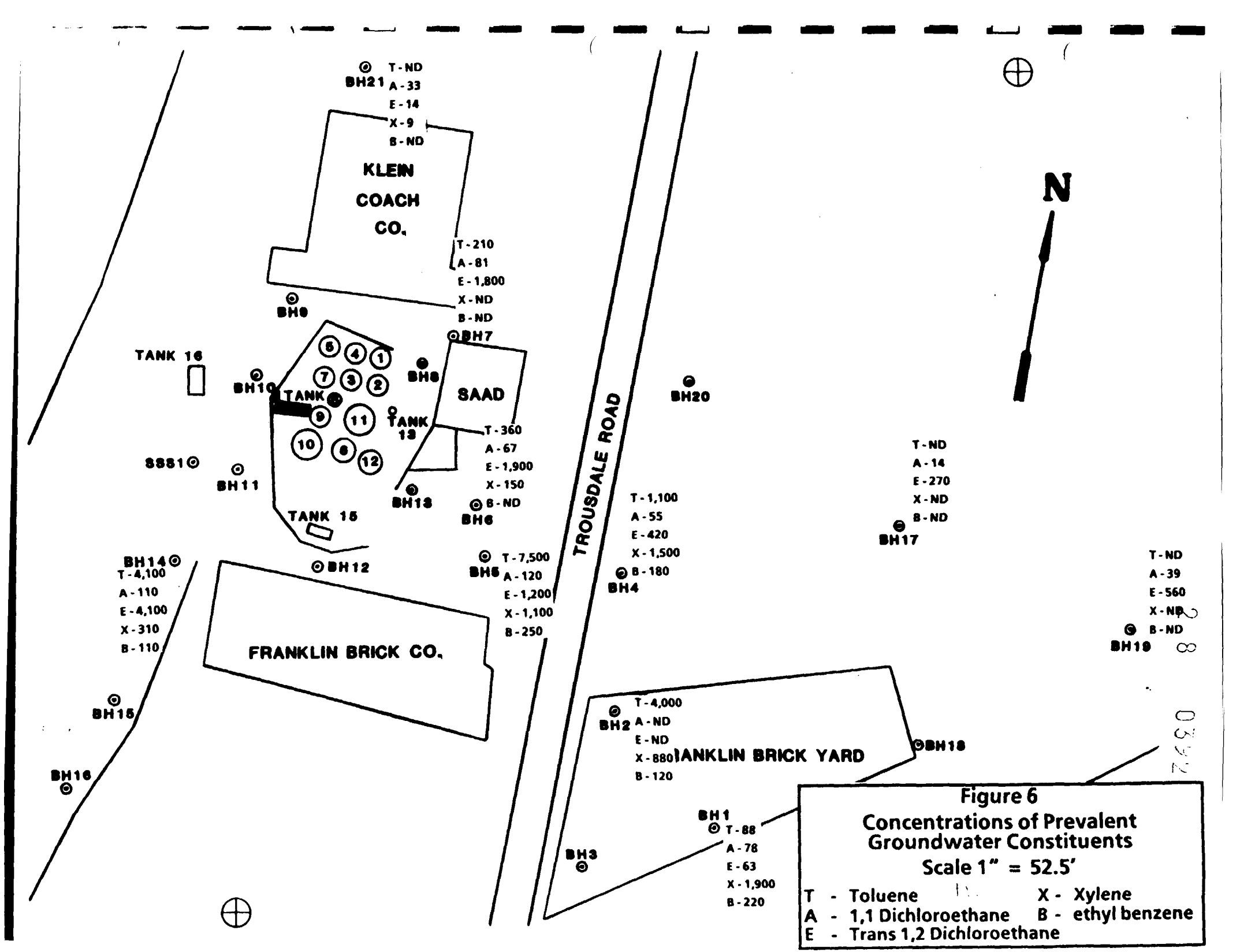
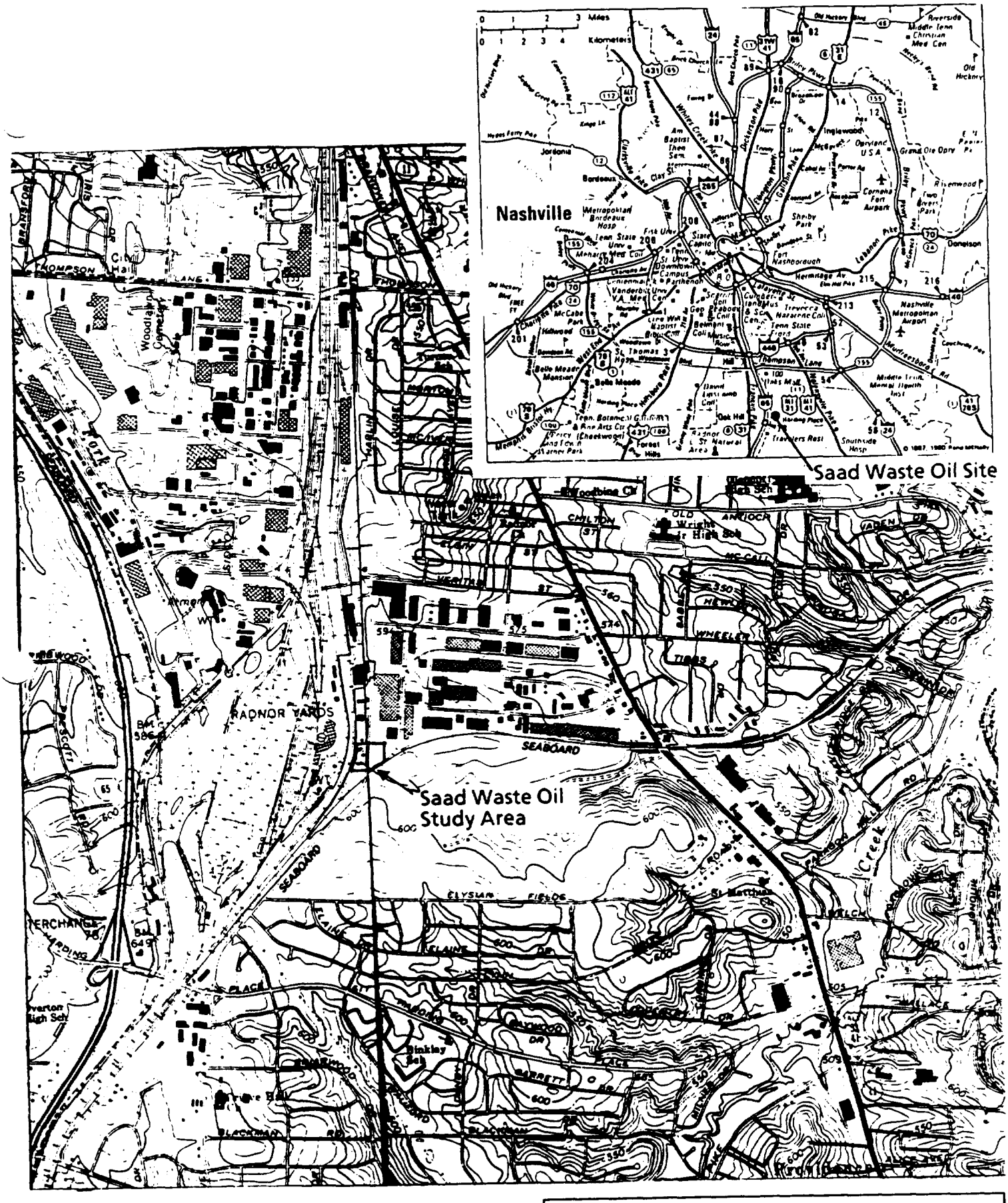


Figure 6
Concentrations of Prevalent Groundwater Constituents
Scale 1" = 52.5'

T - Toluene
A - 1,1 Dichloroethane
E - Trans 1,2 Dichloroethane
X - Xylene
B - ethyl benzene



Scale 1:24,000
Source: U.S.G.S. Oak Hill and Antioch, Tenn. topographic Quadrangles 7.5 Minute Series

Figure 1
Site Location Map
Saad Waste Oil Site

DRAFT

SAAD WASTE OIL

Geotechnical Investigation

8/20/87

DRAFT

SUMMARY

The US EPA Emergency Response Branch (ERB) and contract support group (Environmental Emergency Response Unit [EERU]) were tasked by Region IV EPA to perform a three part investigation of the Saad Waste Oil Site, Nashville TN. (Figure 1). The three sections of this investigation include:

1) Assess quality and quantities of fluids stored in above and underground storage tanks at the Saad Waste Oil site.

2) Determine volume and extent of oil contaminated soil.

3) Evaluate shallow groundwater contamination and potential migration from the site.

The tank investigation identified 16,876 gallons of fluid in three phases. Pumping and batching fluids is suggested, followed by a sludge removal program.

The soil boring and sampling program identified 9,378 yd^3 of oil contaminated soil. The majority of this soil is on the Saad site, but there is migration to the southeast. Removal is unrealistic due to extent, volume and the water table in the oil contaminated soil. Remedial options include capping and a slurry wall/cutoff trench or in-situ stabilization. The latter is the most feasible due to the lack of perimeter space for a slurry wall or cutoff trench.

An examination of site groundwater demonstrated contaminant migration southeast and possibly a secondary northeast pathway. There was no correlation observed between the site and Croft Spring.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

DRAFT

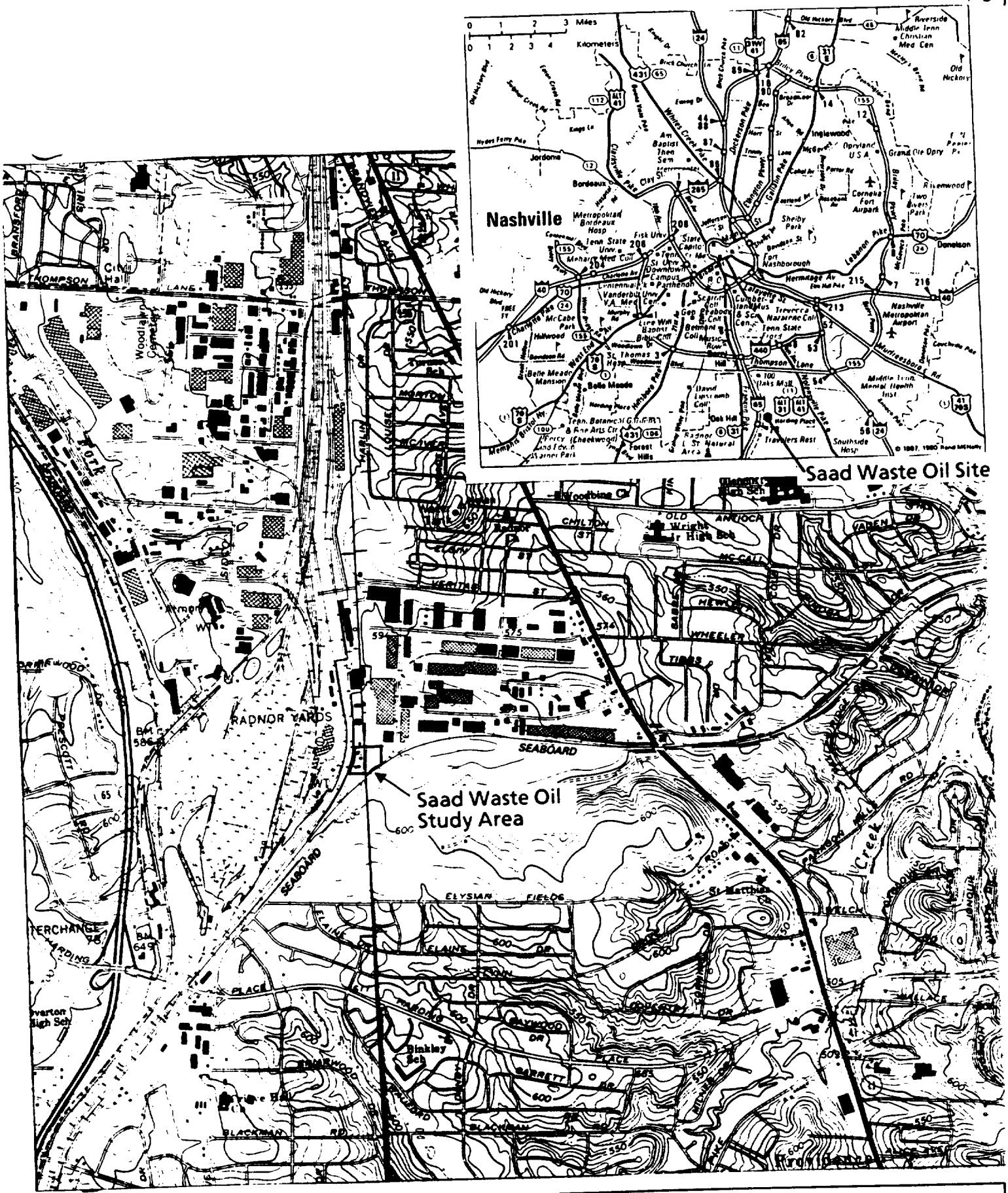
1.0 INTRODUCTION

Saad Waste Oil is the former John P.Saad Oil Company on Trousdale Blvd., Nashville TN (Figure 1). The operation began in 1970 and gained notoriety in 1978 when a pond at the west end of the site was found to contain waste solvents. Drums suspected of containing hazardous waste were found on the site in 1979.

The site, underlain by the Bigby-Cannon limestone and the Hermitage formations, exhibits karstic development. The suspect pond was rumored in a sinkhole that was partially on John P. Saad Oil Company and CSX Railroad porperty. Waste oil migration through the karstic formations to a major spring (Croft Spring), potentially downgradient of the site is a potential impact from the site. The spring discharges in a planned wildlife area of the Cumberland Museum. Prior investigations concentrated on the Croft Spring, attempting to identify a hydrologic connection between Croft Spring and CSX Railroad and/or Saad Waste Oil.

An electrical resistivity study (4/82) by Ecology and Environment (E&E) identified potential solution cavities that could direct flow from Saad Waste Oil and/or CSX to the Croft Spring. Seven monitoring wells were installed to confirm the electrical resistivity survey. Five monitoring wells were installed on the Croft Farm (Cumberland Museum property) and one each on Saad and CSX properties. A sampling program was conducted by NUS Corporation during 8/82 and 9/82.

ERB/EERU initially conducted surface and groundwater sampling program at the Croft Farm, Saad Waste Oil, and CSX Railyard (6/87). A soil boring, monitoring well installation, and sampling program concentrating on the Saad Waste Oil site was performed during 3/87 (Figure 2).



Scale 1:24,000
Source: U.S.G.S. Oak Hill and Antioch,
Tenn. topographic Quadrangles
7.5 Minute Series

Figure 1
Site Location Map
Saad Waste Oil Site

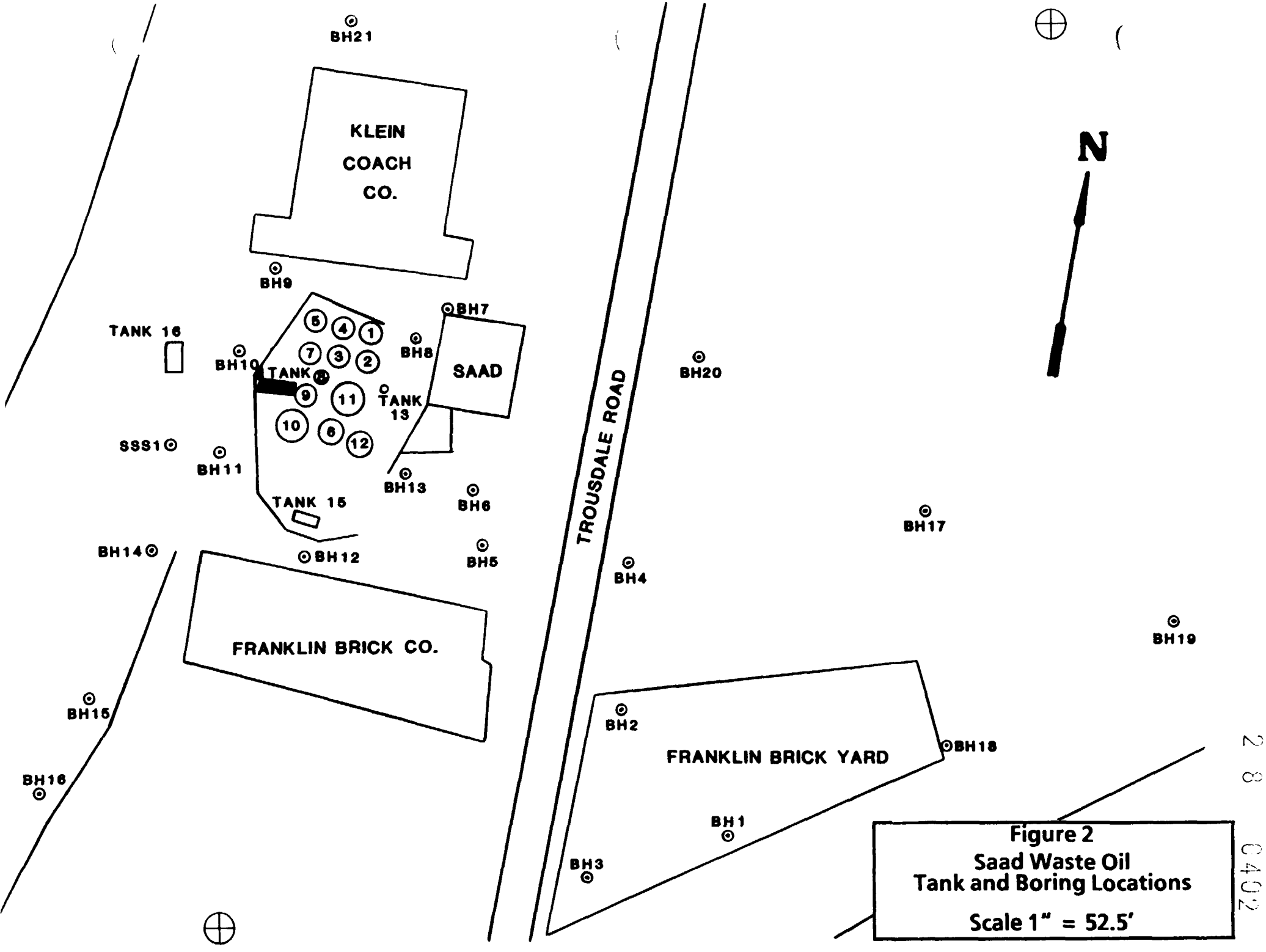


Figure 2
Saad Waste Oil
Tank and Boring Locations

Scale 1" = 52.5'

2.0 FIELD INVESTIGATION

The Saad Waste Oil field investigation program was designed to provide: information for removal of liquids stored on site in tanks, extent and volume of waste oil contaminated soils, and assessment of groundwater contaminant migration from the site.

2.1 Tank Investigation Program

The tank investigation program was designed to provide tank fluid volumes and chemistry, to be used in a removal program (Figure 2). Three visual classifications of tank fluid phases were used: water, oil water emulsion, and oil (Table 1). Fluid volume calculations were based on the these classifications (Table 1). Several samples were composited to reduce laboratory costs and simulate removal batching (Table 2 and 3, Appendix A).

A composite sample from Tanks 1, 4, 6, 11 and Truck Tank 16 (Lab Sample No's. 5719 and 5720, Table 3) sent for laboratory analysis, represented: 2,678 gallons of oil, 170 gallons of oil/water emulsion, and 2,557 gallons of water. Fluid removal should isolate Tank 1 (completely oil) and Tank 4 (water and oil/water emulsion). Tanks 6, 11, and Truck Tank 16 should be pumped with a two phase recovery system or passed through an oil water separator.

Tank 15 (Sample 1258) contains 161 gallons of oil and 2,713 gallons of water. Recovery could be similar to Tanks 6, 11, and Truck Tank 16. Batching the oil and water samples separately from the composite of Tanks 1, 4, 6, 11, 15 and Truck Tank 16 should be relatively simple with questionable recoverability of 161 gallons of oil from Tank 15 as a separate phase. This batching would produce 2,839 gallons of oil and 5,270 gallons of water.

TABLE 1

TANK FLUID VOLUME ESTIMATES

Tank Number	Phase	Fluid Volume (gallons)	Corresp. Lab Sample Number	Comments
1	Oil	2,596	5719	Entire Volume Oil
2	----	----	----	Empty
3	----	----	----	Collapsed - No Access
4	Oil/Water Emulsion Water	45 856	5719 5719	5% Oil Water-Emulsion 95% Amber Liquid
6	Water	23	5719	100% Amber liquid
10	Oil/Water Emulsion	4,270	1260	Leaking @2.5'
11	Oil Water	82 1,553	5719 5719	5% Oil 95% Amber Liquid
12	Water	840	----	Not Sampled
13	----	----	----	Empty
14	----	----	----	Empty
15	Oil Water	161 2,713	1258	Oil Layer 0.3' Thick
16	Oil/Water Emulsion Water	125 125	5720 5720	50% Oil Water Emulsion 50% Water
Oil Water Separator	Water Sludge	3,200 287	1261	

TABLE 2

TANK SAMPLES, KEY TO LABORATORY ANALYSIS

Lab/Chain of Custody No.	Description of Tanks Sampled	Sample Date
5719	Composite of Tanks: 1, 4, 6, 11 and Truck Tank 16	3/20/87
5720	Duplicate Composite of Tanks: 1, 4, 6, 11 and Truck Tank 16	3/20/87
1258	Tank 15	3/17/87
1260	Tank 10	3/18/87
1261	Oil/Water Separater Pit - Eastern Tank	3/18/87

TABLE 3

TANK SAMPLES, LABORATORY ANALYSIS SUMMARY

Sample Parameter		Sample Number (Concentrations in ug/g unless noted)					
		Method Blank	5719	5720	1258	1260	1261
Acetone		32			1300		
2-Butanone		31		12	2900		
Methylene Chloride			13	19	6	220	
1,1-Dichloroethane			3*	4*			
1,1,1-Trichloroethane			22	24		9	
Trichloroethene			20	32	43	98	
Toluene			33	32	8	170	
Ethyl benzene			5*	5*			
Total xylenes			9	9		11	
4-Methyl-2-pentanone					68	15	
Tetrachloroethene			2*				
Pesticides/PCB's in Oil			ND	ND	ND	ND	ND
bis (2-Ethylhexyl) phthalate					1.1	474	3.9
Phenanthrene			21				0.11
Napthalene			44				
2-M ıylnaphthalene			110				
Flourene			15				
	Detection Limit						
Antimony	2.0		ND	ND	ND	ND	ND
Arsenic	1.0		ND	ND	ND	4.9	ND
Beryllium	0.1		ND	ND	ND	ND	ND
Cadmium	0.5		0.84	0.81	0.82	0.64	0.66
Chromium	0.4		7.58	7.86	20.6	76.6	14.1
Copper	0.5		28.4	27.3	33.5	3.3	13.7
Lead	3.5		574	728	549	25.8	136
Mercury	0.1		0.28	ND	ND	ND	ND
Nickel	0.75		3.3	2.6	1.4	4.3	2.9
Selenium	0.5		ND	ND	ND	ND	ND
Silver	0.25		ND	ND	ND	ND	ND
Thallium(2)			ND	ND	ND	ND	ND
Zinc	0.15		304	315	218	63.6	147
Flashpoint	°F		<7	<70	<72	<70	<70
% Ash			0.31	0.23	0.25	0.81	0.03
BTU/pound			9,350	8,500	0	15,300	500
Total Organic Halogens (1)			0.20	0.26	0.09	0.55	0.09

notes a value below the limit of quantification that is considered approximate
1) TOX values are reported as % chlorine
2) Detection Limits for thallium varied due to background corrections for matrix effects
ND None Detected

Tank 10 was sampled separately (Sample 1260) containing 4,270 gallons of oil/water emulsion and should be treated as a separate batch. Recovery could be through simple transfer pumping with the possibility of an oil/water separator.

The site oil/water separators contain 3,200 gallons of water and 39 cubic feet of sludge. The water phase can be easily pumped, with undetermined pumpability of the sludge. Passing the discharge through an oil/water separator is advisable.

Total tank fluid volumes include: 2,839 gallons of oil, 4,440 gallons of oil/water emulsion, and 8,470 gallons of water. After tank fluid removal is complete, the remaining material should be mainly sludges. A clean up program should be developed based on consistancy of material encountered. Pressurized steam cleaning and pumping is an alternative to manually scraping the tanks.

2.2 Soil Boring and Sampling Program

The soil boring and sampling program was designed to identify the horizontal and vertical extent, chemical constituents, and volume of waste oil contaminated soil. There were 103 soil samples collected from 21 borings (Table 4). Nine soil samples, representative of the site, were collected for Volatile organic and Pesticide/PCB laboratory analysis (Tables 4, 5, 6, and Appendix A). The horizontal extent of visable oil contamination is outlined by the 2' contour on the Isopach of Oil Contaminated Soil (Figure 3). Vertical extent of contamination is identified on the soil boring logs in Appendix B. Thickness of contamination is identifed by the isopach of oil contaminated soil.

Initially, the extent of contamination was estimated in the waste oil lagoon encompassing Borings B10, B11 (Monitoring Well 11) and Well SSS1 (Figure 3). Review of an earlier field program in the Franklin Brick Yard identified potential oil contaminated soil. The soil boring plan was designed to isolate brick yard contami-

TABLE 5
PHYSICAL BOREHOLE INFORMATION

Original Numbering System	Modified Numbering System	Borehole Depth Below GS	Presence of Oil in Boring	Depth to Water Table Below GS	Ground Surface (MSL)	Bedrock Surface (MSL)
B-1	B-1	13.5'	Yes	7.57	581.7	568.20
B-2	B-2	17.5'	No	15.17	580.3	563.10
B-3	B-3	5'4"	No	- (1)	581.3	
B-4	B-4	9'1'	Yes	5.58	580.1	571.02
B-6	B-5	19.5'	Yes	7.22	581.5	562.0
B-8	B-6	20'2"	Yes	6.20	581.7	561.53
B-9	B-7	10.0'	Yes	6.62'	582.1	562.10
B-10	B-8	4.5'	Yes	- (1)	-	
B-11	B-9	5.25'	Yes	- (2)	581.5	
B-13	B-10	6'4"	Yes	- (2)	582.0	
B-16	B-11	17'8"	Yes	6.65'	582.2	564.53
B-18	B-12	10.5'	Yes	6.68'	581.8	
B-19	B-13	20'1"	Yes	-		
B-20	B-14	20.0'	No	2.31	581.4	561.40
B-21	B-15	2.25'	No	- (1)	581.8	579.55
B-22	B-16	3.5'	No	- (1)	581.4	577.90
B-23	B-17	14.25'	No	3.46'	578.7	564.95
B-24	B-18	8.5'	Yes	6.13'	581.8	573.30
B-25	B-19	18.0'	No	17.24	580.3	563.80
B-26	B-20	15.0'	No	4.44	581.1	566.10
B-27	B-21	18.0'	No	6.77'		

(1) Borehole completed above Water Table.
(2) Borehole collapse above Water Table.

TABLE 6
VOLATILE ORGANICS A( ) PESTICIDE PCB'S IN SOIL
Concentrations Reported In ug/kg

Parameter	Borehole/Depth										
	B-2 6.0'-7.5'	B-4 4.0'-5.0'	B-6 10.0'-13.0'	B-10 4.5'-6.0'	B-11 12.5'	B-11 14.0'	B-11 16.0'	B-14 3.0'-4.1'	B-18 6.5'-8.5'	B-18 6.5'-8.5' Duplicate	SSS1 (Oil) (ug/g)
Lab Sample No.	B-2, 5-5	B-4, 4'-5'	B-8,R-1,10-13	B-13,4.5-6	B-16,R-1,2.5	B-16,R-1,14	B-16,R-2,BOB	B-20,3-4.1	B-24, R-1, 6.5'-8.5'	B-24,R-1 6.5'-8.5'	7334
Methylene Chloride			16	950					38*		670
Trans-1,2-Dichloroethane	2*		8*	13,000							
2-Hexanone			23*						270		
Toluene			54	29,000	53,000	100	3*	3,900			1300
Total xylenes	330	590	120	9,800		23		3,700			
Acetone	22			1,200*	1,100*	340	800	810*			
Chlorobenzene											
Ethyl benzene	95	110		2,200*	4,600	7*		610*	380		230
2 Butanone						71	96				
4 Methyl-2-pentanone	33			530*		38	49				
Benzene	5*										
1,1 Dichloroethane				18,000						19*	130
1,1,1-Trichloroethane				28,000							1700
Trichloroethene				930							4800
Tetrochloroethene				3,200							4800
Vinyl chloride											290
Trans-1,2-dichloroethylene											4200
Pesticides/PCB's (ug/g)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1242 (ug/l)											36
Aroclor 1260 (ug/l)											17

ND - None Detected
*Denotes a value below the limit of quantification that is considered approximate

nation or connect it to oil migrating from the site. The soil boring program identifed oil contaminated soil from the site, thinning southeast to the brick yard area. (Figure 3).

Clean areas (borings with no visible oil contamination) north and east are delineated by boreholes 17, 19, 20, and 21. Clean areas to the south and west are identified by boreholes 2, 14, 15, and 16. Rail lines prohibited definition of the western and southeastern boundaries of oil contaminated soil. These clean classifications are based on visual examination of soil samples. Questionable boundaries exist at the Franklin Brick Co. office and shop building and the Klein Coach Co. building.

An isopach (Figure 3) was developed to calculate oil contaminated soil volumes. Sources for the oil contaminated soil thickness are the soil boring logs in Appendix B. The total estimate of oil contaminated soil is 9,378 yd^3. This estimate does not include clean soil overlying the contaminated material. Volumes were calculated using Figure 3 and a compensating polar planimeter. The majority of waste oil contaminated soil is within site property boundaries.

Bedrock topography and waste oil contaminated soil were compared to identify possible oil migration correlations with bedrock configuration (Figure 4). Sources for the Bedrock Contour maps were boring logs in Appendix B, summarized in Table 5. Bedrock contours approximately reflect waste oil migration on the site and to the southeast. The bedrock high at boring B18 southeast of the site does not correlate with the oil migration at the soil rock interface. Boreholes 1 and 4 represent additional oil contaminated soil areas that are upgradient of the site based on bedrock topography. There is no information available west of the site.

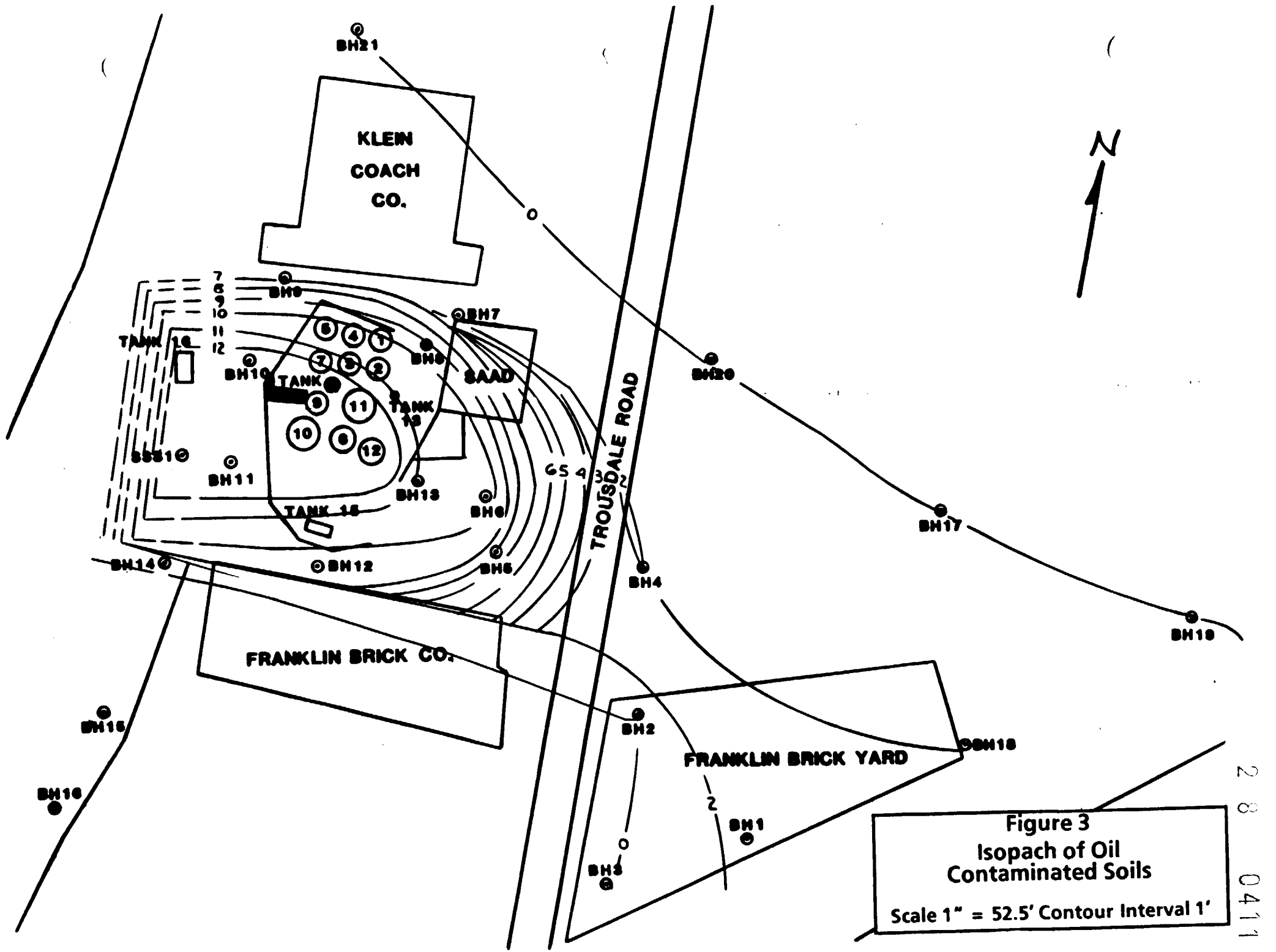
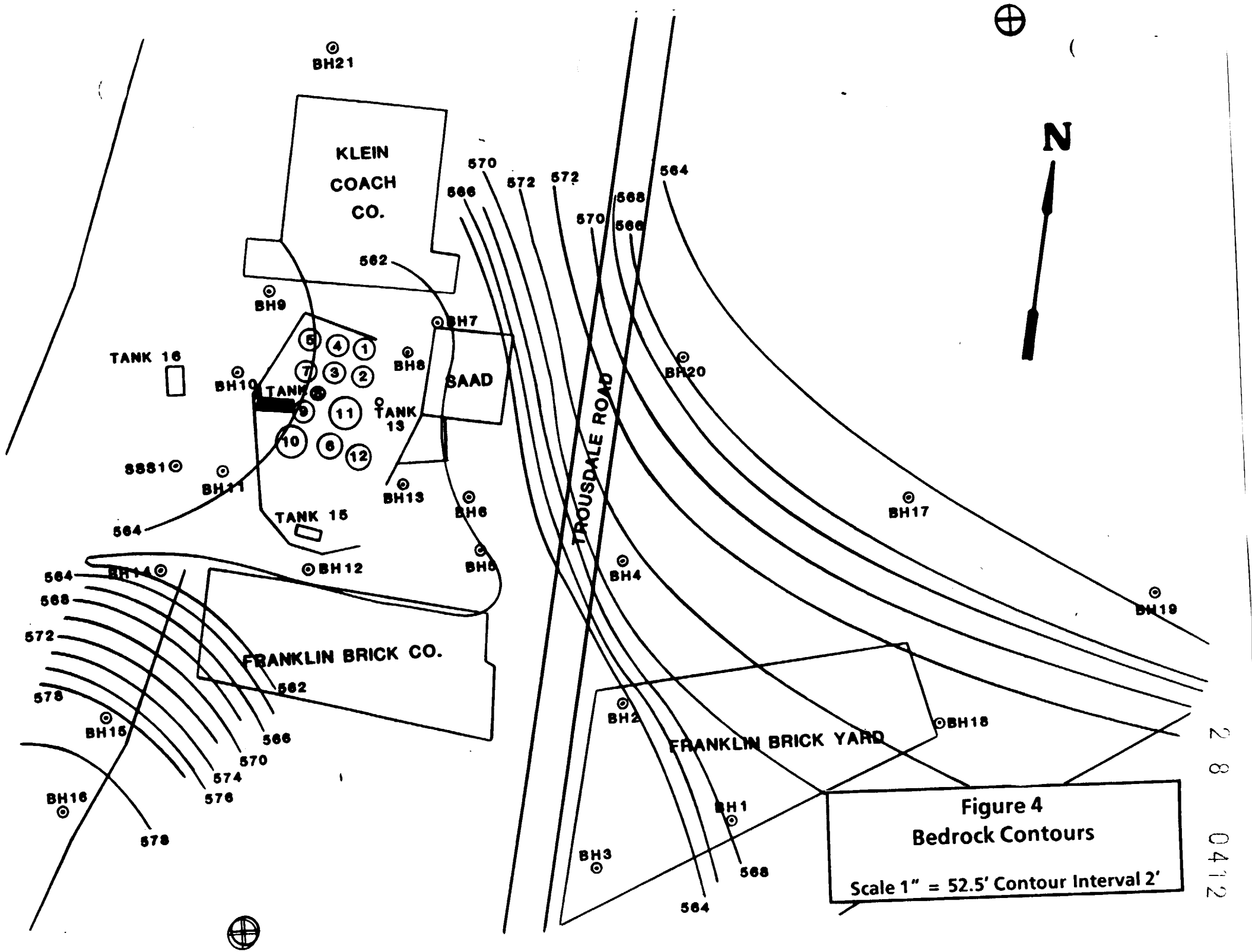


Figure 3
Isopach of Oil Contaminated Soils

Scale 1" = 52.5' Contour Interval 1'


BH21
KLEIN COACH CO.
562
BH9
BH7
BH8
TANK 16
BH10
TANK 14
SAAD
TANK 13
SS81
BH11
BH13
BH6
TANK 15
564
BH12
BH5
BH14
564
568
572
578
BH15
566
570
574
576
BH16
578
FRANKLIN BRICK CO.
562
570
572
572
566
568
570
564
TROUSDALE ROAD
BH20
BH17
BH4
BH19
BH2
BH18
FRANKLIN BRICK YARD
BH1
BH3
568
564
N
Figure 4
Bedrock Contours
Scale 1" = 52.5' Contour Interval 2'

Samples for soil chemistry analysis (Table 6, Appendix B & C) were collected with split barrel or continuous tube samplers, represented on boring logs by S and R designations, respectively. Equipment was pressure steam cleaned between samples. Split barrel samples were more reliable in obtaining a sample. However, when the continuous tube sampler worked, samples were larger and appeared less disturbed.

Volatile organic concentrations were higher in the lagoon area, represented by soil samples B-10, B-11 and oil sample SSS1. There are three compounds that may be considered markers for the site: Toluene, Total xylenes, and Ethyl benzene. Concentrations indicate migration to the southeast decreasing with distance from the proposed lagoon (B-6, 4, 2, and 18 in increasing distance from the lagoon). There were no Pesticide/PCB's identified in any soil samples, just in the soil sample from Well SSS1.

Vertical attenuation of concentrations is represented by samples collected from borehole B-11 at 12.5', 14.0', and 16.0'. Visual oil concentrations that decreased with depth were supported by laboratory analysis (Table 6).

Examination of the log for borehole 14 does not identify oil migration to the south, although volatile organic concentrations in the soil are considerable. A possible explanation is the auger refusal prohibiting sampling of borehole 14 below 4.1' or water phase contaminant transport.

An Auto Skimmer was installed in existing wells SSS-1 and MW11 during the March, 1987 drilling program. The purpose of the Auto Skimmer was to determine passive recoverability of product from the Saad Site. Passive product recoverability does not use a watertable depressing pump to increase the hydraulic gradient to the well. The advantage of a passive system is no discharge from a depressant pump to be disposed of or injected back to the formation.

The Auto Skimmer is a top filling bailer that is lowered to the water table where the buoyancy of the bailer triggers an incremental lowering of the bailer. When the bailer begins filling, the buoyancy changes and the lowering process stops. After filling, the bailer is raised to the surface and emptied through an oil/water separator.

Both wells are located in the area of the reclaimed waste oil lagoon. Well SSS1 is cased through the unconsolidated zone with an open borehole in rock. Well MW11 is screened from approximately two feet above the water table to the soil/rock interface.

The first skimmer test was performed on Well SSS1. There was free product in the well, but an accurate thickness measurement could not be obtained. Water level paste and an EMTEC interface probe were coated by the oil and did not identify the water level. Approximately two gallons of oil were skimmed from the well during the initial cycles of the unit. After the initial recovery, there was no product recharge to the well during a six hour test period. All recovered product was casing storage based on initial water level measurements and displacement of two gallons of product in a 4-inch well. A possible explanation of product storage in the casing could be a seasonally fluctuating water table forcing product into the casing. There was no product recovery from a second test of similar duration.

The Auto Skimmer was installed on monitoring well MW11 immediately after installation. There was an immeasurable product layer noted in the well prior to well installation. The unit operated for several hours with no product recovery.

An auto skimmer was installed in monitoring wells to experiment with passive (no drawdown pump) product recovery. There was no product recharge in the monitoring wells, eliminating passive recovery as a remedial alternative.

2.3 Groundwater

2.3.1 Site Groundwater

Boreholes from the soil boring and sampling program were used to sample and monitor site groundwater levels. If the water table was encountered, temporary screens and casing were installed in boreholes. Monitoring wells were installed in three boreholes, B14, 11, and 18 (Appendix D). All screens were placed above the water table. There were ten water samples collected for volatile organics and pesticide/PCB analysis (Table 7). Sampling equipment was decontaminated with successive detergent, distilled water, methanol, and distilled water rinses between samples. Groundwater levels were measured with a Slope Indicator electrical tape and an EMTEC product/water measuring device. The Slope Indicator worked consistantly, although the EMTEC device performed sporadically. Borehole locations and elevations were surveyed using Well SSS1 for vertical control and existing structures for horizontal control.

Groundwater flow direction and gradient was determined by creating a potentiometric groundwater surface map (Figure 5). A groundwater "trough" runs northwest to southeast through the northeast section of the site. The potentiometric map combined with the isopach of oil contaminated soil (Figure 3) correlate southeast contaminant migration. There is a possible second migration path to the northwest.

Laboratory analysis identified 5 prevalent volatile organics; 1,1 dichloroethane, trans-1,2-Dichloroethane, toluene, ethyl benzene and total xylenes (Table 7). Concentrations of each constituent are presented on Figure 6. Total xylene and ethyl benzene concentrations, two components found in gasoline, are concentrated around Trousdale Road and Franklin Brick Yard, with the exception of B-14 (W-14). Proximity to the road and an

TABLE 7
VOLATILE ORGANICS AND PESTICIDES/PCB'S IN WATER
Concentrations Reported In ug/L

Parameter	Borehole No./Date									
	B-1 3/23/87	B-2 3/23/87	B-4 3/23/87	B-5 3/23/87	B-6 3/23/87	B-7 3/26/87	B-14 3/26/87	B-17 3/23/87	B-19 3/23/87	B-21 3/25/87
Lab Sample No.	**5710**	**5709**	**5707**	**5705**	**5706**	**5715**	**5714**	**5708**	**5711**	**5713**
Methylene Chloride				200*		53*	2500			1*
Trans-1,2-Dichloroethane	63		420	1200	1900	1800	4100	270	560	14
Chloroethane										13
Toluene	88	4000	1100	7500	360	210	4100			
Total xylenes	1900	880	1500	1100*	150*		310			9
Acetone										68
Chloroform										
Ethyl benzene	220	120*	180				110*			
2 Butanone										9*
4 Methyl-2-pentanone							210*			
Benzene	7*	55*								
1,1 Dichloroethane	78		55	120*	67*	81*	110*	14	39*	33
1,1,1-Trichloroethane										8
Trichloroethene							5000			
Vinyl chloride	64		120		280	350		22	140	18
Carbon disulfide				110*						
Pesticides/PCB's	ND	ND		ND	ND	ND	ND	ND	ND	ND
4,4 - DDT			.56							

ND - None Detected
*Denotes a value below the limit of quantification that is considered approximate

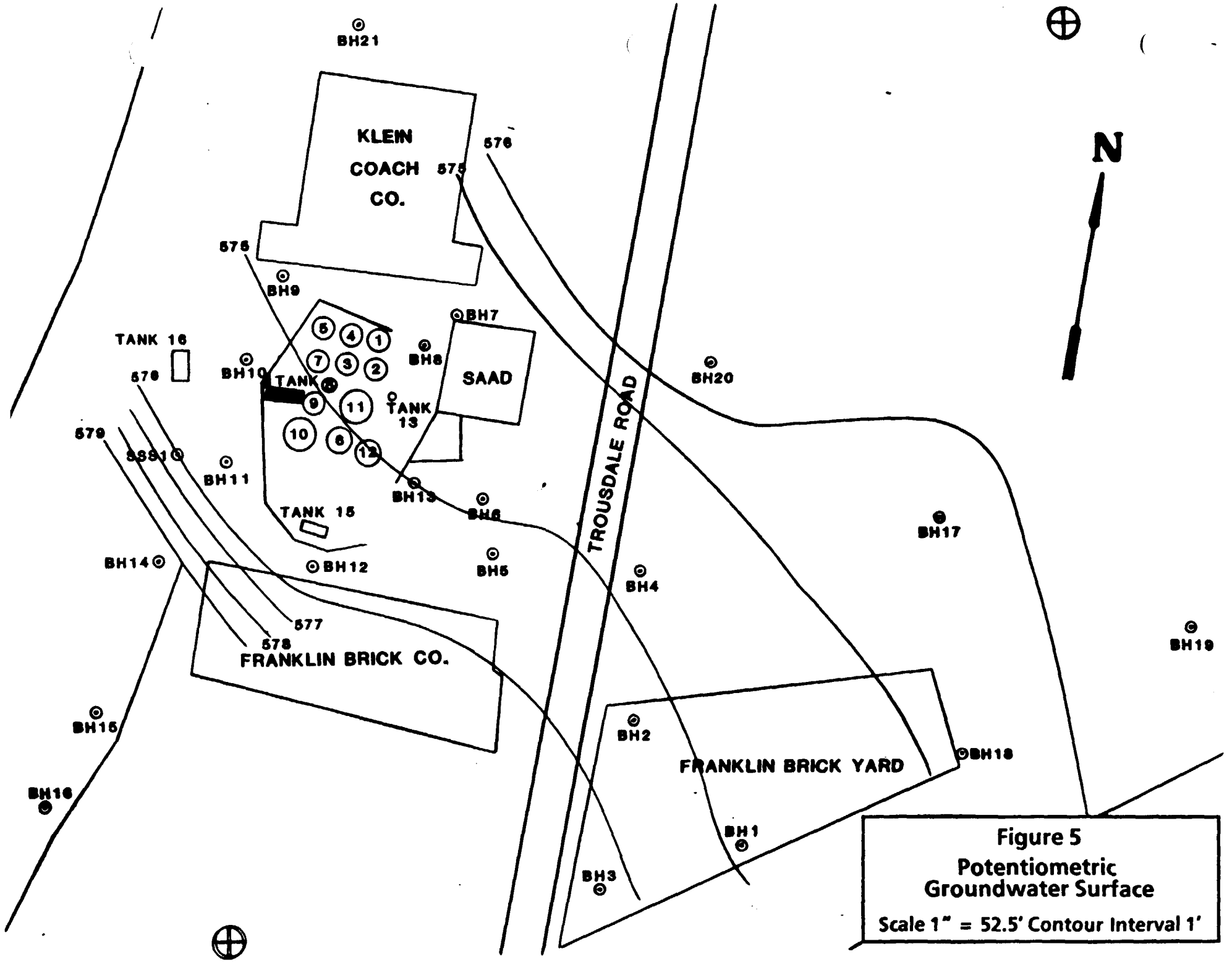
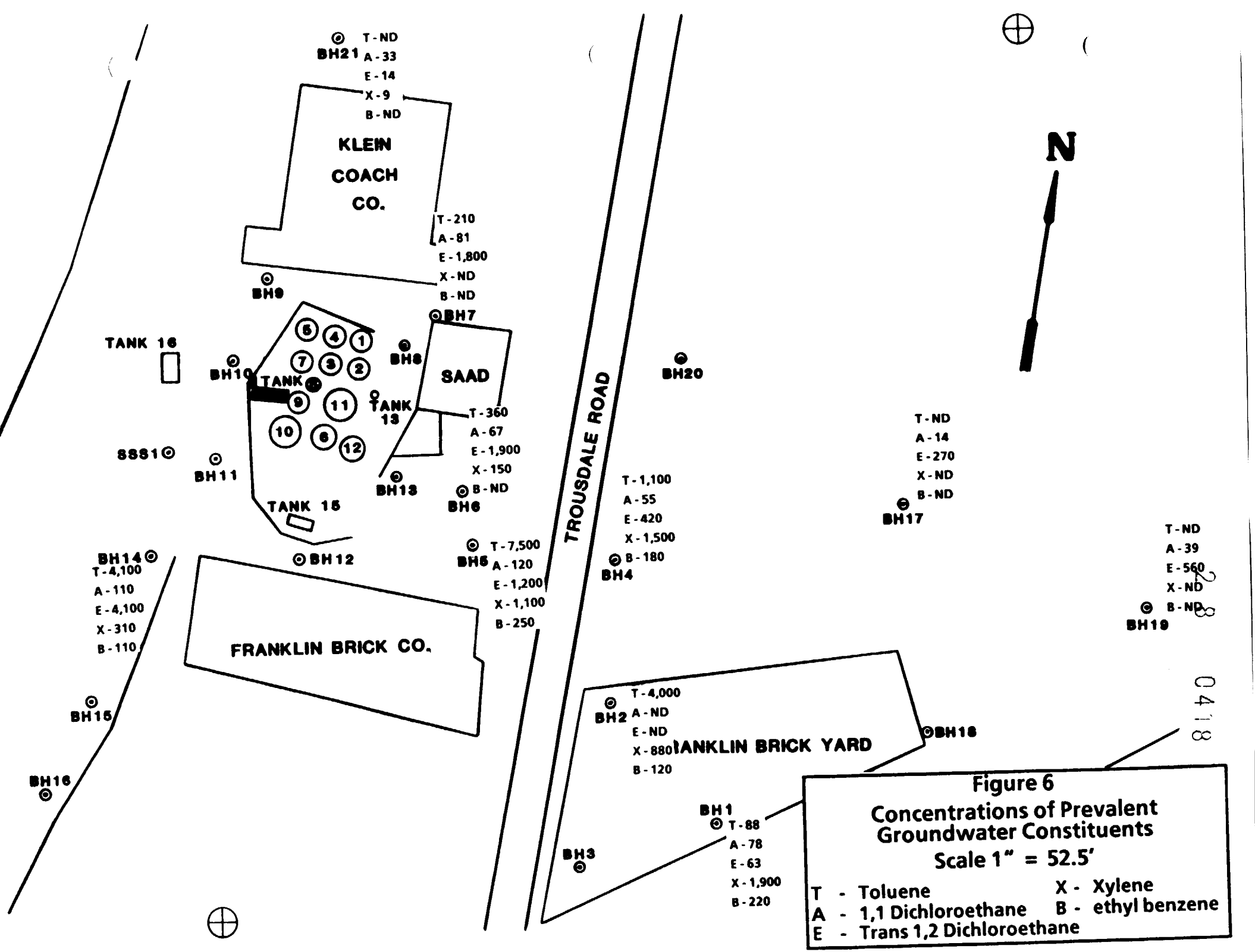


Figure 5
Potentiometric Groundwater Surface
Scale 1" = 52.5' Contour Interval 1'


BH21
T - ND
A - 33
E - 14
X - 9
B - ND
KLEIN
COACH
CO.
T - 210
A - 81
E - 1,800
X - ND
B - ND
BH9
BH7
TANK 16
BH10
TANK
BH8
SAAD
TANK
13
T - 360
A - 67
E - 1,900
X - 150
B - ND
SSS1
BH11
BH13
BH6
TANK 15
BH14
T - 4,100
A - 110
E - 4,100
X - 310
B - 110
BH12
BH5
T - 7,500
A - 120
E - 1,200
X - 1,100
B - 250
TROUSDALE ROAD
BH20
T - 1,100
A - 55
E - 420
X - 1,500
B - 180
BH4
T - ND
A - 14
E - 270
X - ND
B - ND
BH17
T - ND
A - 39
E - 560
X - ND
B - ND
BH19
FRANKLIN BRICK CO.
BH15
BH16
T - 4,000
A - ND
E - ND
X - 880
B - 120
BH2
FRANKLIN BRICK YARD
BH18
BH1
T - 88
A - 78
E - 63
X - 1,900
B - 220
BH3
N
Figure 6
Concentrations of Prevalent
Groundwater Constituents
Scale 1" = 52.5'
T - Toluene
A - 1,1 Dichloroethane
E - Trans 1,2 Dichloroethane
X - Xylene
B - ethyl benzene

underground storage tank in the brick yard may be alternate contaminent sources to the Saad site. However, these constituents were identified in on site soils analysis.

All samples have concentrations of 1,1-Dichloroethane, and trans-1,2-Dichloroethane, two common solvents. Borings B-17 and 19 are upgradient of the site, indicating possible additional sources of groundwater contamination. Toluene is found in all borings except upgradient boreholes 17 and 19, and borehole 21. Concentrations attenuate to the southeast with increased distance from the site. Toluene concentrations in boreholes 6 and 7 are lower than borehole 5, indicating a potential secondary migration path to the northeast. The toluene concentrations correlate with a buried "shot rock" site drain identified by local workers.

The potentiometric groundwater surface and water chemistry analysis indicate southeast and possibly northeast contaminant migration. Additional contaminant sources may exist based on results from boreholes 17 and 19, and the ethyl benzene/total xylene concentrations in samples near the Franklin Brick yard.

Hydraulic properties of the unconsolidated water table aquifer were determined by performing a single well pumping test in borehole B-6 (Appendix E). Drawdown was minimal at maximum pump capacity. Recovery occurred before any measurements could be made, limiting calculations to drawdown data. Transmissivity was 28,448 GPD/ft and hydraulic conductivity was 6.27×10^{-1} cm/sec. A potential explanation for these hydraulic conditions is the gravel and boulder zones encountered in the boring program. These hydraulic conditions may be representative of a limited area with highly transmissive conditions. A higher pumping rate for an extended period of time is needed to identify these potential boundary conditions.

2.3.2 Off-Site Groundwater

A potential hydraulic connection between Saad Waste Oil and/or the CSX Railyard and the Croft Spring may be possible based on waste oil contaminated soil, site groundwater chemistry, and potentiometric water levels directed to the southeast toward Croft Spring. However, distance and the karstic nature of the bedrock prohibit any positive correlations between site contaminant migration and Croft Spring.

Examination of Croft Spring and monitoring well Volatile organic chemistry analysis (Table 8, Appendices A, C & F) do not reveal a connection between the site and Croft Spring. Base Neutral/Acid Extractable analysis reveal similar results.

The lack of corresponding laboratory results do not prove or disprove a hydraulic connection between the site and Croft Spring. The karstic nature of this bedrock aquifer offers a multitude of possible discharge mechanisms that may not have occured during sampling periods.

TABLE 8
OFF-SITE GROUNDWATER

Parameter	Sample									
	Croft Spring	Croft Spring	Croft Spring	Saad Monitoring Well	Saad Monitoring Well 9/87	Well #1 9/87	Well #2	Well #2 9/87	Well #3	Well #3 9/87
Lab Sample No.	SS-S-7-W	SS-CF-SP	7333	SS-SS-MW7	3334	7331	SS-CF-MG2	7332	SS-CF-MW3	7353
Sampling Program			3/87		3/87	3/87		3/87		3/87
1,1 Dichloroethane	2J	ND	ND	1,100	1,700		ND	ND	ND	ND
Chloroform	0.5J			11						
Chlorobenzene	2J									
Vinyl Chloride				6,600	9,800					
Methylene Chloride				19,000	5,500					
1,1 Dichloroethene				690						
Chloroethane				240						
Trans-1,2-Dichloroethane				95,000	52,000					
1,2 Dichloroethane				31						
1,1,1-Trichloroethane				15,000	6,300					
Trichloroethene				69,000	30,000	<5				
Benzene				67						
Tetrachloroethene				49,000	9,600					
Toluene				3,900	4,600					
Chlorobenzene				87						
Ethyl benzene				310	500					

ND - No VOA's detected in analysis

J - Estimated Value

3.0 CONCLUSIONS

3.1 Tank Investigation Program

The tank investigation identified 16,876 gallons of mixed; oil, oil/water emulsion, and water phase fluids stored at the site. Batching recommendations provide a simple removal scheme. Batching may be simplified if an onsite oil/water separator is used. Removal of sludges remaining after pumping is possible by pressure cleaning and/or scraping (shoveling the sludge).

3.2 Soil Boring and Sampling Program

The soil boring and sampling program identified oil contaminated soil in a much broader area than the reclaimed waste oil lagoon. The entire site is underlain by oil contaminated soil with southeast oil migration to the Franklin Brick Company property. The majority of the estimated 9,378 yd^3 of oil contaminated soil is on Saad Waste Oil property.

Volume and exent of contamination make soil removal difficult. Extensive overburden off site and a groundwater table above the bottom of waste throughout make removal unrealistic.

There are two remedial methods (or combinations) that prohibit further waste oil migrations. The first alternative could be capping the site with an impermeable material to prevent infiltration (asphalt). The water table in contaminated soils necessitates a slurry wall or cutoff trench to inhibit off-site contaminant migration from groundwater flow through the site. Spatial limitations virtually eliminate slurry wall or cutoff trench construction. A second alternative could be in-situ stabilization of oil contaminated soil using pressure grouting techniques.

3.3 On Site Groundwater

The groundwater potentiometric surface and laboratory analysis indicate flow primarily to the southeast and possibly to the northwest. High transmissivity of the oil contaminated zones (gravel layers) could provide a rapid contaminant transport system if not for the low groundwater gradient and inconsistency of materials encountered.

Remedial alternatives discussed in the Soil Boring section could effectively inhibit leaching and migration of contaminants by groundwater. When choosing a remedial alternative, downward vertical contaminant migration on and off site should be considered.

3.4 Off-Site Groundwater

The soil boring and on-site groundwater monitoring program identify contaminant migration to the southeast, the direction of Croft Spring. However, offsite groundwater samples including Croft Spring do not identify contaminant transport. This does not eliminate site contamination of Croft Spring, but requires further investigation into contaminant pathways. Injection of tracers to determine flow paths is premature until there is a better understanding of contaminant transport.

APPENDIX A

ANALYTICAL RESULTS, TANK SAMPLINGS, SITE SOIL, AND SITE GROUNDWATER

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GSA RARITAN DEPOT, BLDG. 209, BAY F
EDISON, NJ 08837
201-548-9660

SAAD WASTE OIL SITE
Nashville, TN
Project No. 37069190499
July 29, 1987

Submitted to: G. Prince-USEPA-ERT

Submitted by:
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TABLE OF CONTENTS

SECTION V
GC/MS Data for Volatile Organics in Oil

SECTION VI
GC Data for Pesticides/PCBs in Water

SECTION VII
GC Data for Pesticides/PCBs in Soil

SECTION VIII
GC Data for Pesticides/PCBs in Oil

SECTION IX
GC/MS Data for Base Neutral/Acid Extractables in Oil

SECTION X
Data for Metals in Oil

SECTION XI
Data for Incineration Parameters

SECTION XII
Interlaboratory Correspondence

SECTION XIII
Chain of Custody Records

INTRODUCTION

On March 20, 1987, five oil samples were sent to Versar Laboratory in Virginia from the Saad Waste Oil Site in Nashville, Tennessee. Priority pollutant volatile organics, PCBs, pesticides, base-neutral/acid extractables, and metals plus, incineration parameters (TOX, BTU, ash, and ignitability) analyses were performed. On March 23, seven water samples and ten soil samples were submitted to Versar for priority pollutant volatile organics and pesticides/PCBs analyses. Sample No. B-16,R-2 BOB is erroneously listed on the chain of custody records as a water sample; it is in fact a soil sample.

ANALYTICAL PROCEDURES

WATER

Volatile Organics: The volatile organics analyses were conducted according to Contract Laboratory Program (CLP) protocols. Most samples required dilution due to high concentrations of the parameters of interest. The method blanks for these analyses contained methylene chloride and acetone. The background for these compounds was subtracted from samples showing a positive response. Results are presented in Table 1. CLP criteria for calibration linearity were met for all compounds. Instrument detection limits were also acceptable. Detection limits varied for these samples due to the dilutions. Detection limits for each sample can be located in Section III. They are provided in the form of CLP sample reporting data sheets. Also included in this section are the listings of tentatively identified compounds. These compounds do not meet CLP criteria for identification and should be used with discretion.

Pesticides/PCBs: The pesticides/PCB analyses were conducted according to EPA Method 608 of the Federal Register. Results are presented in Table 2. All samples were analyzed as low level and met all detection limit criteria established by CLP. PCBs were undetected in all samples. 4,4'-DDT was found in sample 5707 but the chromatography was poor on both columns and Versar strongly suggests that this may be a false positive. In addition, since the linearity of DDT exceeded CLP limits, this result is somewhat questionable. No results are reported for sample 5708. The original analysis of the water samples indicated "overactivated" sorbent was used to clean the sample extracts and the extraction and analysis of the samples were repeated. Sample 5708 was expended during the initial analysis. The holding times for the extraction of the samples was exceeded.

SOILS

Volatile Organics: These analyses were conducted according to CLP

protocols. The soils contained various levels of volatile compounds and detection limits varied accordingly. The detection limits for each sample are provided in Section IV in the form of CLP data sheets. Also included in this section are listings of tentatively identified compounds. These compounds do not meet CLP criteria for identification and should be used with discretion. All compounds met CLP standards for calibration linearity and detection limits. The results are presented in Table 3.

Pesticides/PBCs: Samples were prepared and analyzed according to EPA Method 8080. Pesticides and PCBs were undetected in these samples. Results are presented in Table 4.

OILS

Volatile Organics: Samples were prepared by diluting one gram of oil in one milliliter of methanol. Sample extracts were analyzed by direct injection of a 1 ul aliquot onto the column to the GC/MS. The methanol blank contained acetone and 2-butanone. This background was subtracted from any sample hits for these compounds. Calibration range linearity was within CLP limits for all compounds except acetone and 2-butanone, probably due to the presence of these compounds in the methanol. In addition, the concentration of acetone and 2-butanone in Sample 1258 exceeded the linear calibration range and should be considered approximate. Redilution of this sample was not possible since only a small oil layer was present in the sample container and it was expended during the initial dilution. Results are presented in Table 5. Section V contains a listing of tentatively identified compounds. These compounds do not meet CLP criteria for identification and should be used with discretion.

Pesticides/PCBs: The samples were prepared and analyzed according to EPA Method 8080. Pesticides and PCBs were undetected in these samples as shown in Table 6. Linearity criteria as established by CLP were not met for alpha-BHC, delta-BHC, gamma-BHC, aldrin, 4,4'-DDT and methoxychlor. All other parameters were within the CLP limits. Detection limits were also met. Results are presented in Table 6.

Base Neutral/Acid Extractables: The samples were prepared according to EPA Method 8270. Sample analyses were conducted according to CLP protocol. All detection limit and linearity criteria were met with the exception of benzoic acid. Linearity for this compound exceeded the 35% relative standard deviation limit. Results are presented in Table 7. Section IX contains a list of tentatively identified compounds. These compounds did not meet CLP criteria for identification and should be considered as marginally accurate. Sample 1261 was analyzed in triplicate. Phenanthrene was detected in one of the three analyses. Bis(2-ethylhexyl)phthalate was detected in two of the three analyses. The analysis of one 1261 sample did not confirm the presence of either compound but GC/MS data for tentatively confirmed compounds indicate that they may be present. The analysis of these samples was complicated due to high

concentrations of numerous hydrocarbons which created background interferences.

Metals: Samples were analyzed according to EPA Methods 6010, 7060, 7470, and 7740 for priority pollutant metals. All calibration and linearity criteria were met. Results are presented in Table 8.

The results of the incineration parameter testing are presented in Table 9.

Table 1. Volatile Organics in Water

Concentrations reported in ug/L

Sample No.	Parameter	Concentration
5705 (Diluted 100x)	Methylene chloride	200.*
	Carbon disulfide	110.*
	1,1-Dichloroethane	120.*
	trans-1,2-Dichloroethene	1200.
	Toluene	7500.
	Ethyl benzene	250.*
	Total xylenes	1100.*
5706 (Diluted 20x)	Vinyl chloride	280.
	1,1-Dichloroethane	67.*
	trans-1,2-Dichloroethene	1900.
	Toluene	360.
	Total xylenes	150.*
5707 (Diluted 10x)	Vinyl chloride	120.
	1,1-Dichloroethane	55.
	trans-1,2-Dichloroethene	420.
	Toluene	1100.
	Ethyl benzene	180.
	Total xylenes	1500.
5708 (Diluted 2x)	Vinyl chloride	22.
	1,1-Dichloroethane	14.
	trans-1,2-Dichloroethene	270.
5709 (Diluted 50x)	Benzene	55.*
	Toluene	4000.
	Ethyl benzene	120.*
	Total xylenes	880.
5710 (Diluted 5x)	Vinyl chloride	64.
	1,1-Dichloroethane	78.
	trans-1,2-Dichloroethene	63.
	Benzene	7.*
	Toluene	88.
	Ethyl benzene	220.
	Total xylenes	1900.

*denotes a value below the limit of quantification that is considered approximate.

Table 1. Volatile Organics in Water (Cont'd)

Concentrations reported in ug/L

Sample No.	Parameter	Concentration
5711 (Diluted 10x)	Vinyl chloride	140.
	1,1-Dichloroethane	39.*
	trans-1,2-Dichloroethene	560.
5712	Methylene chloride	1.*
	Chloroform	2.*
	1,1,1-Trichloroethane	2.*
	Trichloroethene	2.*
5713	Vinyl chloride	18.
	Chloroethane	13.
	Methylene chloride	1.*
	Acetone	68.
	1,1-Dichloroethane	33.
	trans-1,2-Dichloroethene	14.
	2-Butanone	9.*
	1,1,1-Trichloroethane	8.
	Total xylenes	9.
5714 (Diluted 50x)	Methylene chloride	2500.
	1,1-Dichloroethane	110.*
	trans-1,2-Dichloroethene	4100.
	Trichloroethene	5000.
	4-Methyl-2-pentanone	210.*
	Toluene	4100.
	Ethyl benzene	110.*
	Total xylenes	310.
5715 (Diluted 25x)	Vinyl chloride	350.
	Methylene chloride	53.*
	1,1-Dichloroethane	81.*
	trans-1,2-Dichloroethene	1800.
	Toluene	210.

*denotes a value below the limit of quantification that is considered approximate.

Table 2. Results of Pesticides/PCBs in Water

Concentrations reported in ug/L

Sample No.	Parameter	Concentration
Method Blank	None detected	--
5705	None detected	--
5706	None detected	--
5707	4,4'-DDT	.56
5708	None detected	--
5709	None detected	--
5710	None detected	--
5711	None detected	--
5712	None detected	--
5713	None detected	--
5714	None detected	--
5715	None detected	--

Table 3. Volatile Organics in Soil

Concentrations reported in ug/kg

Sample No.	Parameter	Concentration
B-8 R1 10-13 (Diluted 2x)	Methylene chloride	16.
	trans-1,2-Dichloroethene	8.*
	2-Hexanone	23.*
	Toluene	54.
	Total xylenes	120.
B-20 3-4.1 (Diluted 100x)	Acetone	810.*
	Toluene	3900.
	Ethyl Benzene	610.*
	Total Xylenes	3700.
B-16 R1-14 (Diluted 2x)	Acetone	340.
	2-Butanone	71.
	4-Methyl-2-pentanone	38.
	Toluene	100.
	Ethyl benzene	7.*
	Total xylenes	23.
B-16 R2 BOB	Acetone	800.
	2-Butanone	96.
	4-Methyl-2-pentanone	49.
	Toluene	3.*
B-2 S-5	Acetone	22.
	trans-1,2-Dichloroethene	2.*
	Benzene	5.*
	4-Methyl-2-pentanone	33.
	Ethyl benzene	95.
	Total Xylenes	330.
B-4 4'-5' (Diluted 2x)	Ethyl benzene	110.
	Total xylenes	590.
B-16 R1 2.5 (Diluted 250x)	Acetone	1100.*
	Toluene	53000.
	Ethyl benzene	4600.

*denotes a value below the limit of quantification that is considered approximate.

Table 3. Volatile Organics in Soil (Cont'd)

Concentrations reported in ug/kg

Sample No.	Parameter	Concentration
B-35 S-2 6.5-8.5 (Diluted 10x)	1,1-Dichloroethane	19.*
B-24 R1 6.5-8.5 (Diluted 10x)	Methylene chloride	38.*
	2-Hexanone	270.
	Ethyl benzene	380.
B-13 4.5-6 (Diluted 100x)	Methylene chloride	950.
	Acetone	1200.*
	1,1-Dichloroethane	18000.
	trans-1,2-Dichloroethene	13000.
	1,1,1-Trichloroethane	28000.
	Trichloroethene	930.
	4-Methyl-2-pentanone	530.*
	Tetrachloroethene	3200.
	Toluene	29000.
	Ethyl benzene	2200.*
	Total xylenes	9800.

*denotes a value below the limit of quantification that is considered approximate.

Table 4. Pesticides/PCBs in Soil

Concentrations reported in ug/g

Sample No.	Parameter	Concentration
B-2 S-5	None detected	--
B-4 4-5	None detected	--
B-8 R-1 10-13	None detected	--
B-13 4.5-6	None detected	--
B-16 R-1 2.5	None detected	--
B-16 R-2 BOB	None detected	--
B-16 R-1 14	None detected	--
B-20 3-4.1	None detected	--
B-24 R-1 6.5-8.5	None detected	--
B-35 S-2 6.5-8.5	None detected	--

Table 5. Volatile Organics in Oil

Concentrations reported in ug/g

Sample No.	Parameter	Concentration
Method Blank	Acetone	32.
	2-Butanone	31.
5719	Methylene chloride	13.
	1,1-Dichloroethane	3.*
	1,1,1-Trichloroethane	22.
	Trichloroethene	20.
	Tetrachloroethene	2.*
	Toluene	33.
	Ethyl benzene	5.*
	Total xylenes	9.
5720	Methylene chloride	19.
	1,1-Dichloroethane	4.*
	2-Butanone	12.
	1,1,1-Trichloroethane	24.
	Trichloroethene	32.
	Toluene	32.
	Ethyl benzene	5.*
	Total xylenes	9.
1258	Methylene chloride	6.
	Acetone	1200.
	2-Butanone	2900.
	Trichloroethene	43.
	4-Methyl-2-pentanone	68.
	Toluene	8.
1260	Methylene chloride	220.
	1,1,1,-Trichloroethane	9.
	Trichloroethene	98.
	4-Methyl-2-pentanone	15.
	Toluene	170.
	Total xylenes	11.
1261	None detected	--

*denotes a value below the limit of quantification that is considered approximate.

Table 6. Results of Pesticides/PCBs in Oil

Concentrations in ug/g

Sample No.	Parameter	Concentration
1258	None detected	--
1258 (Duplicate)	None detected	--
1260	None detected	--
1261	None detected	--
5719	None detected	--
5720	None detected	--

Table 7. Results of Base Neutral/Acid Extractables in Oils

Concentrations reported in ug/g

Sample No.	Parameter	Concentration
Method Blank	None detected	--
1258	None detected	--
1260	bis(2-Ethylhexyl)phthalate	474.
1261	bis(2-Ethylhexyl)phthalate	1.1
1261 (Duplicate 1)	None detected	--
1261 (Duplicate 2)	Phenanthrene	0.11*
	bis(2-Ethylhexyl)phthalate	3.9
5719	Naphthalene	44.
	2-Methylnaphthalene	110
	Phenanthrene	21.
	Fluorene	15.
5720	None detected	--

* denotes a response that is below the limit of quantification and considered approximate.

Table 8. Results of Metals in Oil Analysis

Concentrations reported in ug/g

Parameter	Concentration					
	Detection Limit	5719	5720	1258	1260	1261
Antimony	2.0	ND	ND	ND	ND	ND
Arsenic	1.0	ND	ND	ND	4.9	ND
Beryllium	0.1	ND	ND	ND	ND	ND
Cadmium	0.5	0.84	0.81	0.82	0.64	0.66
Chromium	0.4	7.58	7.86	20.6	76.6	14.1
Copper	0.5	28.4	27.3	33.5	3.3	13.7
Lead	3.5	574.	728.	549.	25.8	136.
Mercury	0.1	0.28	ND	ND	ND	ND
Nickel	0.75	3.3	2.6	1.4	4.3	2.9
Selenium	0.5	ND	ND	ND	ND	ND
Silver	0.25	ND	ND	ND	ND	ND
Thallium	*	ND	ND	ND	ND	ND
Zinc	0.15	304.	315.	218.	63.6	147.

ND denotes not detected.
*Detection limits for thallium varied due to background corrections for matrix effects.

Table 9. Incineration Testing for Oil

Sample No.	Flashpoint oF	% Ash	BTU/ pound	Total organic Halogens*
5719	<70	0.31	9350.	0.20
5720	<70	0.23	8500.	0.26
1258	<72	0.25	0	0.09
1260	<70	0.81	15300.	0.55
1261	<72	0.03	500.	0.09

*TOX values reported as % chlorine.

QA/QC PROCEDURES

Volatile Organics: All water, soil and oil samples were spiked with three surrogate standards. In the case of water and soil samples, these surrogate standards were used to assure the efficiency of the purge and trap unit. For the oil samples, the surrogates were used to establish the extraction efficiency. The surrogate standard recoveries are presented in QA/QC Table 10. All recoveries were within CLP advisory limits.

Two water samples were spiked in duplicate with a five component volatile organics mixture to determine the presence of any matrix interferences. All compounds were within the advisory limits established by CLP. Results are presented in QA/QC Table 11.

One soil sample and one oil sample were spiked with a five component volatile organics mixture. All recoveries were within CLP advisory limits. Results are presented in QA/QC Table 12 for the soil sample and QA/QC Table 13 for the oil.

Pesticides/PCBs: All water, soil and oil samples were spiked with a surrogate standard, dibutylchlorendate, to assure extraction efficiency. These results are presented in QA/QC Table 14. One water sample, 5706, showed a low recovery of 23%. The laboratory provided no possible cause. The soil samples showed recoveries in excess of 150% for 9 out of 12 analyses. The analysis of the soil samples for volatile organics by GC/MS indicated elevated concentrations of hydrocarbons which are the most likely reason for the high surrogate recoveries for the pesticides. The oil samples also showed high recoveries for samples 1260, 1261, 5719, and 5720.

Two water samples, 5712 and 5709, were spiked in duplicate with a three component mixture of pesticides. Five of six recoveries for these compounds in sample 5712 exceeded the CLP advisory limits. Six of six recoveries for sample 5709 exceeded 200%. The laboratory suggested that this sample may have been "double spiked". These results are presented in QA/QC Table 15.

One soil sample, B-16 R-2 BOB, was spiked with a six component pesticide mixture. All recoveries were within the CLP advisory limits except 4,4'-DDT which had a 155% recovery. The linearity of the 4,4'-DDT was unacceptable throughout these analyses. The results are presented in QA/QC Table 16.

One oil sample, 1258, was spiked with a six component pesticide mixture. Again, all recoveries, except 4,4'-DDT, were within CLP advisory limits. The results are reported in QA/QC Table 17.

No PCB matrix spikes were performed.

Base Neutral/Acid Extractables: The oil samples were spiked with three base neutral surrogate standards and three acid surrogate standards. The recoveries were within CLP advisory limits for all surrogates in all samples except sample 5719. Sample 5719 showed elevated recoveries for all but one surrogate. These results are presented in QA/QC Tables 18A and 18B.

Metals: One oil sample, 1261, was analyzed in duplicate to determine matrix homogeneity. The relative percent differences for all detected metals were less than 10 as presented in QA/QC Table 20.

Sample 5720 was spiked with 1.0 ug/g mercury to determine any matrix effects. The recovery was 50% possibly due to complexing of the mercury with chlorides during sample digestion. The volatile organics analysis for this oil sample confirmed the presence of organochlorine compounds (See Table 5 of Section I, Results). Sample 5719 was spiked with arsenic and selenium and showed recoveries of 104% and 114%, respectively. Sample 1260 was spiked with a mixture of the ten remaining priority pollutant metals. All recoveries were within a range of 60%-125% except silver which had a recovery of 53%. This sample contained high concentrations of organochlorine compounds, possibly resulting in complexing of the silver and chlorine during digestion with subsequent precipitation. The results of these matrix spikes are presented in QA/QC Table 21.

QA/QC Table 22 presents the results of duplicate incineration parameters analyses. The relative percent differences did not exceed 15. The flashpoint testing was not performed in duplicate.

QA/QC Table 10. Surrogate Standard Recoveries for Volatile Organics in Water, Soil, and Oil

Sample No.	% Recovery Toluene-D8	% Recovery Bromofluorobenzene	% Recovery 1,2-Dichloroethane-D4
Water:			
5705	101	104	92
5706	101	101	96
5707	98	98	93
5708	98	102	87
5708 (MS)	96	99	89
5708 (MSD)	93	100	91
5709	98	99	88
5710	98	100	90
5711	98	103	92
5712	101	107	92
5713	102	108	92
5713 (MS)	98	101	94
5713 (MSD)	97	99	96
5714	99	98	88
5715	97	98	91
Soil:			
B-2 S-5	100	89	96
B-4 4-5	108	100	108
B-8 R-1 10-13	99	107	95
B-13 4.5-6	102	102	122
B-16 R-1 2.5	104	98	89
B-16 R-2 BOB (Dil 5X)	101	97	94
B-16 R-2 BOB	103	100	101
B-16 R-1 14	103	102	111
B-20 3-4.1	105	103	119
B-24 R-1	101	134	115
B-35 S-2	102	109	92
B-2 S-5 (MS)	96	93	80
B-2 S-5 (MSD)	99	94	81
Oil:			
1258	95	107	105
1260	95	106	106
1261	92	105	109
5719	101	100	109
5719 (MS)	98	103	108
5719 (MSD)	98	106	106
5720	95	106	106

QA/QC Table 11. Matrix Spike/Matrix Spike Duplicate Recoveries for Volatile Organics in Water

Concentrations reported in ug/L

All parameters spiked at 50 ug/L

Parameter	Sample	Recovered MS	Recovered MSD	% Recovery MS	% Recovery MSD	RPD
Sample No. 5708						
1,1-Dichloroethene	ND	33	32	66	64	3.1
Trichloroethene	ND	47	44	94	88	6.6
Chlorobenzene	ND	44	43	88	86	2.3
Toluene	ND	44	42	88	84	4.6
Benzene	ND	43	39	86	78	9.8
Sample No. 5713						
1,1-Dichloroethene	ND	49	49	98	98	0
Trichloroethene	ND	50	50	100	100	0
Chlorobenzene	ND	49	48	98	96	2.0
Toluene	ND	50	50	100	100	0
Benzene	ND	48	48	96	96	0

MS denotes matrix spike. MSD denotes matrix spike duplicate.
RPD denotes relative percent difference.
ND denotes not detected.

QA/QC Table 12. Matrix Spike/Matrix Spike Duplicate Recoveries for Volatile Organics in Soils

Concentrations reported in ug/kg

All parameters spiked at 50 ug/kg

Parameter	Sample Conc.	Recovered Conc.		% Recovery		RPD
		MS	MSD	MS	MSD	
Sample B-2 S-5						
1,1-Dichloroethene	ND	65.	67.	130	134	3.0
Trichloroethene	ND	53.	55.	106	110.	3.7
Chlorobenzene	ND	45.	52.	90.	104	14.
Toluene	ND	45.	49.	90.	98.	8.5
Benzene	5.*	44.	48.	78.	86.	11.

MS denotes matrix spike. MSD denotes matrix spike duplicate.
RPD denotes relative percent difference.
ND denotes not detected.
* denotes a value that is below the limit of quantification and considered approximate.

QA/QC Table 13. Matrix Spike/Matrix Spike Duplicate Recoveries for Volatile Organics in Oil

Concentrations reported in ug/g

All parameters spiked at 100 ug/g

Parameter	Sample Conc.	Recovered Conc.		% Recovery		RPD
		MS	MSD	MS	MSD	
Sample No. 5719						
1,1-Dichloroethene	ND	112	116	112	116	3.5
Trichloroethene	20.	118	129	98	109	11.
Chlorobenzene	ND	98	98	98	98	0
Toluene	33.	125	133	92	100	8.3
Benzene	ND	97.	100.	97.	100	3.0

MS denotes matrix spike, MSD denotes matrix spike duplicate.
RPD denotes relative percent difference.
ND denotes not detected.

QA/QC Table 14. Surrogate Standard Recoveries for Pesticides/PCBs in Water, Soil and Oil

Sample No.	Matrix	% Recovery Dibutylchlorendate
5705	Water	31.
5706	Water	23.
5707	Water	120
5709	Water	70
5709 MS	Water	120
5709 MSD	Water	129
5710	Water	46
5711	Water	20
5712	Water	100
5712 MS	Water	100
5712 MSD	Water	100
5713	Water	30
5714	Water	70
5715	Water	50
B-2 S-5	Soil	190
B-4 4-5	Soil	560
B-8 R-1 10-13	Soil	320
R-13 4.5-6	Soil	300
B-16 R-1 2.5	Soil	110
B-16 R-2 BOB	Soil	110
B-16 R-1 14	Soil	170
B-20 3-4.1	Soil	350
B-24 R-1 6.5-8.5	Soil	930
B-35 S-2 6.5-8.5	Soil	1380
B-16 R-2 BOB (MS)	Soil	130
B-16 R-2 BOB (DUP)	Soil	230
1258	Oil	100
1258 Duplicate	Oil	110
1258 MS	Oil	100
1260	Oil	320
1261	Oil	550
5719	Oil	270
5720	Oil	1330

MS denotes matrix spike, MSD denotes matrix spike duplicate.
DUP denotes duplicate.

QA/QC Table 15. Matrix Spike/Matrix Spike Duplicate Recoveries for Pesticides in Water

Concentrations reported in ug

All parameters spiked with .5 ug

Parameter	Sample Conc.	Recovered Conc. MS	Recovered Conc. MSD	% Recovery MS	% Recovery MSD	RPD
Sample No. 5712						
Dieldrin	ND	.62	.63	124	126	3.2
Endrin	ND	.74	.78	148	156	5.3
4,4'-DDT	ND	.93	.79	186	158	16.3
Sample No. 5709						
Dieldrin	ND	1.1	1.2	220	240	9.0
Endrin	ND	1.3	1.4	260	280	7.0
4,4'-DDT	ND	1.2	1.2	240	240	0

MS denotes matrix spike, MSD denotes matrix spike duplicate.
RPD denotes relative percent difference.
ND denotes not detected.

QA/QC Table 16. Matrix Spike Recoveries for Pesticides in Soil

Concentrations reported in ug

Parameter	Sample Conc.	Spike Conc.	Recovered Conc.	% Recovery
Sample No. B-16 R-2 BOB				
gamma-BHC	ND	0.80	0.78	98.
Heptachlor	ND	0.80	0.78	98.
Aldrin	ND	0.80	0.78	98.
Dieldrin	ND	2.0	2.0	100.
Endrin	ND	2.0	2.2	110.
4,4'-DDT	ND	2.0	3.1	155.

ND denotes not detected.

QA/QC Table 17. Matrix Spike Recoveries for Pesticides in Oil

Concentrations reported in total ug

Parameter	Sample Conc.	Spike Conc.	Recovered Conc.	% Recovery
Sample No. 1258				
Lindane	ND	2.0	2.2	110
Heptachlor	ND	2.0	1.9	95
Aldrin	ND	2.0	2.3	115
Dieldrin	ND	5.0	6.1	122
Endrin	ND	5.0	6.2	124
4,4"-DDT	ND	5.0	7.6	154

ND denotes not detected.

QA/QC Table 18A. Surrogate Standard Recoveries for Base Neutral Extractables

Sample No.	% Recovery Nitrobenzene-D4	%Recovery 2-Fluorobiphenyl	% Recovery p-Terphenyl-D14
1258	88.	60	78
1260	83	59	68
1261	89	69	65
1261 Dup	95	90	64
1261 MS	92	84	56
5719	316	180	220
5720	94	63	82

MS denotes matrix spike.

QA/QC Table 18B. Surrogate Standard Recoveries for Acid Extractables

Sample No.	% Recovery 2-Fluorophenol	%. Recovery Phenol-D5	% Recovery 2,4,6-Tribromophenol
1258	79.	80.	86
1260	79.	79.	81
1261	87.	85.	96
1261 Dup	80.	78	95
1261 MS	90.	81.	102.
5719	148.	208.	122.
5720	89.	89.	84.

MS denotes matrix spike.

QA/QC Table 19. Matrix Spike Recoveries for Base Neutral/Acid Extractables in Oil

Concentrations reported in ug/ml

Parameter	Sample Conc.	Spike Conc.	Recovered Conc.	%Recovery
Sample 1261				
1,2,4-Trichlorobenzene	ND	100.	80.	80.
Acenapthene	ND	100.	77.	77.
2,4-Dinitrotoluene	ND	100.	97.	97.
Pyrene	ND	100.	55.	55.
N-nitrosodi-n-propylamine	ND	100.	68.	68.
1,4-Dichlorobenzene	ND	100.	61.	61.
Pentachlorophenol	ND	200.	192	96.
Phenol	ND	200.	131	66.
2-Chlorophenol	ND	200.	132	66.
4-Chloro-3-methylphenol	ND	200.	161	80.
4-Nitrophenol	ND	200.	162	81.

ND denotes not detected.

QA/QC Table 20. Duplicate Metals in Oil Analyses

Concentrations reported in ug/g

Parameter	Run 1	Run 2	RPD
Sample No. 1261			
Antimony	ND	ND	--
Beryllium	ND	ND	--
Cadmium	0.66	0.66	0
Chromium	14.1	15.	6.2
Copper	13.7	14.	2.2
Lead	136.	134.	1.5
Nickel	2.9	2.7	7.1
Silver	ND	ND	--
Thallium	ND	ND	--
Zinc	147.	146.	0.7

RPD denotes relative percent difference.
ND denotes not detected.

QA/QC Table 21. Matrix Spike Recoveries for Metals in Oil

Concentrations in ug/g

Parameter	Sample Conc.	Spike Conc.	Recovered Conc.	% Recovery
Sample No. 1260				
Antimony	ND	100.	67.8	67.8
Beryllium	ND	50.	46.7	93.4
Cadmium	0.64	50.	37.5	73.7
Chromium	76.6	50.	139	125
Copper	3.3	100.	91.1	87.8
Lead	25.8	100.	89.4	63.6
Nickel	4.3	100.	84.7	80.4
Silver	ND	50.	26.6	53.2
Thallium	ND	100.	73.4	73.4
Zinc	63.6	100.	158.	94.4
Sample No. 5719				
Arsenic	ND	2.5	2.6	104
Selenium	ND	5.0	5.7	114
Sample No. 5720				
Mercury	ND	1.0	.5	50.

ND denotes not detected.

QA/QC Table 22. Duplicate Analyses for Incineration Parameters

Parameter	Sample No.	Run 1	Run 2	Difference	RPD
% Ash	1258	0.27	0.24	0.03	12.
TOX (% as Cl)	1260	0.55	0.57	0.02	3.6
BTU/pound	1260	15,300	15,300	0.0	0.0

RPD denotes relative percent difference.

№ 00123

SHEET NO 1 OF 1

ENVIRESPONSE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NAME Saad Oil Site

PROJECT NO. 370 69 190499

SAMPLER(S) SIGNATURE Cynthia Burchett

SAMPLE IDENTIFICATION	SAMPLING LOCATION	DATE SAMPLED	SAMPLE TYPE: WATER	SOLID	AIR	OIL	COMP	GRAB	VOLUME TO BE COLLECTED	NO OF CONTAINERS	TIME COLLECTION BEGAN	INITIAL	TIME COLLECTION COMPLETED	INITIAL	COMMENTS
B24	6.5'-8.5'	3/20/87		✓				✓	1x8oz	1	—		—		VOA, PESTICIDES/PCB, PP ANALYZE CONTAMINATED PORTION
B13	4.5'-6'	3/20/87		✓				✓	1x8oz	1	—		—		↓
B35	6.5'-8.5'	3/20/87		✓				✓	1x8oz	1	—		—		↓
05705	B6	3/23/87	✓					✓	2x1L	2	-		—		VOA
05705	B6	3/23/87	✓					✓	3x40mL	3	--		--		PP, PESTICIDE/PCB
05706	B8	3/23/87	✓					✓	2x1L	2	—		—		VOA
05706	B8	3/23/87	✓					✓	3x40mL	3	—		—		PP, PESTICIDE/PCB
05707	B4	3/23/87	✓					✓	2x1L	2	—		—		VOA
05707	B4	3/23/87	✓					✓	3x40mL	3	—		—		PP, PESTICIDE/PCB
05708	B23	3/23/87	✓					✓	2x1L	2	—		—		VOA
05708	B23	3/23/87	✓					✓	3x40mL	3	—		—		PP, PESTICIDE/PCB.

RELINQUISHED BY NAME Cynthia Burchett DATE/TIME 3/23/87 1445 RECEIVED BY NAME [illegible] DATE/TIME 3/24/87 0900

RELINQUISHED BY NAME _____ DATE/TIME _____ RECEIVED BY NAME _____ DATE/TIME _____

RELINQUISHED BY NAME _____ DATE/TIME _____ RECEIVED BY NAME _____ DATE/TIME _____

AUTHORIZATION FOR DISPOSAL _____ DATE/TIME _____ DISPOSED BY: _____ DATE/TIME _____

3/24-26

FORM NO. 1541-2

288 0457

№ 00121

SHEET NO 1 OF 1

ENVIRESPONSE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NAME Saad Oil Site

PROJECT NO 370 69190499

SAMPLER(S) SIGNATURE G.J. Burchette

SAMPLE IDENTIFICATION	SAMPLING LOCATION	DATE SAMPLED	SAMPLE TYPE: WATER	SOLID	AIR	OIL	COMP	GRAB	VOLUME TO BE COLLECTED	NO OF CONTAINERS	TIME COLLECTION BEGAN	INITIAL	TIME COLLECTION COMPLETED	INITIAL	COMMENTS
5719	Composite	3/17/87				✓	✓	✓	2x18oz	2	1630	CLB	1830	CLB	Full PP.
5720	Composite	3/17/87				✓	✓	✓	2x18oz	2	1630	CLB	1830	CLB	-TOX
01261	T17 - T18	3/18/87				✓		✓	2x8oz	2	1530	CLB	1600	CLB	-BTU -Ignitability
01260	T10	3/18/87				✓		✓	2x8oz	2	1530	CLB	1600	CLB	-ASH -Corrosivity
01258	T15	3/17/87				✓		✓	3x8oz	3	1630	CLB	1640	CLB	-Na
															* no Cyanides.

RELINQUISHED BY NAME G.J. Burchette DATE/TIME 3/20/87 1400 RECEIVED BY NAME _____ DATE/TIME 3-21-87 0900

RELINQUISHED BY NAME _____ DATE/TIME _____ RECEIVED BY NAME _____ DATE/TIME _____

RELINQUISHED BY NAME _____ DATE/TIME _____ RECEIVED BY NAME _____ DATE/TIME _____

AUTHORIZATION FOR DISPOSAL _____ DATE/TIME _____ DISPOSED BY: _____ DATE/TIME _____

MKP 4-13-87

FORM NO. 1541-27

2 8 0 4 5 8

№ 00122

SHEET NO 1 OF 1

ENVIRESPONSE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NAME Seed Oil Site

PROJECT NO. 32069190499

SAMPLER(S) SIGNATURE Cynthia Burchette

SAMPLE IDENTIFICATION	SAMPLING LOCATION	DATE SAMPLED	SAMPLE TYPE: WATER	SOLID	AIR	OIL	COMP	GRAB	VOLUME TO BE COLLECTED	NO OF CONTAINERS	TIME COLLECTION BEGAN	INITIAL	TIME COLLECTION COMPLETED	INITIAL	COMMENTS
05711	B25	3/23/87	✓					✓	2x1L	2	1400	CLB	1415	CLB	PP, PESTICIDES/PCB
05711	B25	3/23/87	✓					✓	3x40mL	3	1400	CLB	1415	CLB	VOA
05710	B1	3/23/87	✓					✓	2x1L	2	1350	CLB	1400	CLB	PP, PEST./PCB.
05710	B1	3/23/87	✓					✓	3x40mL	3	1350	CLB	1400	CLB	VOA
05709	B2	3/23/87	✓					✓	2x1L	2	1310	CLB	1320	CLB	PP, PESTICIDE/PCB
05709	B2	3/23/87	✓					✓	3x40mL	3	1310	CLB	1320	CLB	VOA
B16	~~B16~~ 12.5'	3/20/87	✓					✓	1x8oz	1	—	CLB	—	CLB	VOA, PESTICIDES/PCB, PP ANALYZE CONTAMINATED PORTION
B16	14'	3/20/87		✓				✓	1x8oz	1	—	CLB	—	CLB	
B16	BOB	3/20/87		✓				✓	1x8oz	1	—	CLB	—	CLB	
B20	3'	3/20/87		✓				✓	1x8oz	1	—		—		
B8	10'-13'	3/20/87		✓				✓	1x8oz	1	—		—		
B4	4'-5'	3/20/87		✓				✓	1x8oz	1	—		—		
B2	35	3/20/87		✓				✓	1x8oz	1	—		—		

RELINQUISHED BY NAME Cynthia Burchette DATE/TIME 3/23/87 1430

RELINQUISHED BY NAME _____ DATE/TIME _____

RELINQUISHED BY NAME _____ DATE/TIME _____

AUTHORIZATION FOR DISPOSAL _____ DATE/TIME _____

RECEIVED BY NAME _____ DATE/TIME 3/24/87 0900

RECEIVED BY NAME _____ DATE/TIME _____

RECEIVED BY NAME _____ DATE/TIME _____

DISPOSED BY: _____ DATE/TIME _____

NMED 4-22-87

2 8 0 0 4 5 9

FORM NO. 1541-27

FIELD DATA SHEET

2 8 0400

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Site

Collectors: Paul Karmazinsky

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
01258	Mo 03 Day 17 Yr 87	1730

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
	Loam
	Peat
	Color:

Depth ____ Ft. or In.

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15° < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low→High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #
T	15

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

TANK #15

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Site

Collectors: George Prince

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
01260	Mo 03 Day 18 Yr 87	1530

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
< 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
Farmland — Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #
T	10

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

TANK # 10

2 8 0462

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Site

Collectors: George Prince

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
01261	Mo 03 Day 18 Yr 17	1550

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
Slope < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #
T	17

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

T17 Oil/Water Separator Pit - Eastern Tank

2 8 0463

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Site

Collectors: GP & CB

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 5705	Mo 013 Day 213 Yr 817	0910

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
	Loam
	Peat
	Color:

Depth ____ Ft. or In.

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
< 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
C : ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low→High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #
B	06

B-5

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

Borehole #6

3 - 40 mils
2 - 1 liter

1 hour after bailing 55 gal.

Oil present

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Site

Collectors: GP

Lab Number (Consec.#'s): NO 5706

Date Collected: Mo 03 Day 23 Yr 87

Time (24 hr): 0925

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15° < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container: (Glass Jar) Plastic Jar, Metal, Acetate Core, Paper Cap, (Teflon Cap), Foil Cap

Storage: Wet Ice, Ambient, Dry Ice

Cleaning Procedure: Low→High Concentration
Detergent Wash
Water Rinse
Acetone Rinse
Hexane Rinse
Other Solvent Rinse
Specify:

TRANSECT INFORMATION

Letter	Station #
B	08

B-b

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

Borehole 8
1 hr after bailing 55 gal
oil present

3 - 40 mils
2 - 1 L

2 8 0465

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Seed Oil Site

Collectors: G. Prince / C. Burchett

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 5707	Mo 03 Day 23 Yr 87	1115

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15° < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.
Sample Depth ____ Ft.
Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

EAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____
Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #
B	04

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

Borehole 4

3 - 40 mils
2 - 1 Liter

1 hr after bailing

oil present

2 8 0466

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Site

Collectors: G Prince C Burchette

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 5708	Mo 013 Day 213 Yr 87	1135

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15° < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
(Glass Jar)	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
(Teflon Cap)	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #
B	2 3

B-17

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

Developed by driller

3 - 40 mils
2 - 1 liter

oil present

2 8 0467

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Oil Site

Collectors: G Prince C Barchetto

Lab Number (Consec.#'s): NO 5709

Date Collected: Mo 03 Day 23 Yr 87

Time (24 hr): 1210

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15° < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
(Glass Jar)	Low→High Concentration
~~Plastic Jar~~	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
~~Paper Cap~~	Hexane Rinse
(Teflon Cap)	Other Solvent Rinse
~~Foil Cap~~	Specify:

Storage
(Wet Ice)
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #
B	02

B-2

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

3 - 40 mils
Bailed 30 minutes previous 2 - 1 liter
oil present
Chemical odor

2 8 0468

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Oil Site

Collectors: G. Prince, C. Burchette

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 5710	Mo 03 Day 23 Yr 87	1350

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
Slope < 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
Farmland — Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
(Glass Jar)	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
(Teflon Cap)	Other Solvent Rinse
~~Foil Cap~~	Specify:

Storage
(Wet Ice)
~~Ambient~~
Dry Ice

TRANSECT INFORMATION

Letter	Station #
B	01

BL

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

purged 15 minutes until dry

3 - 40 mls
2 - 1 liter

2 8 0469

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Oil Site

Collectors: G Prince C Buchatto

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 5711	Mo 013 Day 213 Yr 87	1400

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
< 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.
Sample Depth ____ Ft.
Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____
Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
~~Plastic Jar~~	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
~~Paper Cap~~	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:
Storage	
~~Wet Ice~~	
~~Ambient~~	
Dry Ice	

TRANSECT INFORMATION

Letter	Station #
B	2 5 19

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

purged for 30 minutes
presence of oil

3 - 40 mls
2 - 1 liter

2 8 0470

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Oil

Collectors: H. Prince / C. Burchette

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 5719	Mo 03 Day 10 Yr 87	

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
< 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
Farmland — Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.
Sample Depth ____ Ft.
Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____
Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:
Storage	
Wet Ice	
Ambient	
Dry Ice	

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

Composite of Tank #1
Tank #4
Tank #11
Tank #6
Truck Tank #16

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Saad Oil

Collectors: G. Previe / C. Burchette

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 5720	Mo 03 Day 21 Yr 87	

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
Slope < 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
Farmland — Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

Composite duplicate of:
Tank #1
Tank #4
Tank #11
Tank #6
Truck Tank #16

PROJECT Saad Waste Oil 2 8 0472

PROJECT NO. 37069190499 BORING B-1

ELEVATION 581.7 DATE 3/19/87

FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'- 7"	26/50/1"	Dry	V.Dense		0.0'-2.5' Dark Gray Gravel Fill, Some Reddish Brown Sand and Clay
S-2 1.5'- 3.0'	/9 12/17		M.Dense		2.5'-3.0' Oil Impregnated Gravel, Sand & Clay with Wood Particles (Organic Odor)
S-3 3.0'- 4.5'	10/12	Moist			3.0'-5.0' Oil Impregnated Dark Gray-Black Gravel, Clay, Sand
S-4 4.5'- 6.0'	36/10		Dense		5.0'-6.0' Brown Clay & Gravel; Trace Silt & Sand
S-5 6.0'- 7.5'	10/30		Hard		6.0'-6.5' Oil Impregnated Clay & Gravel; Trace Silt & Sand
S-6 7.5'- 9.0'	20/45 19/10		Hard		6.5'-7.5' Brown Clay & Gravel, Trace Silt & Sand
R-1 9.0'- 13.0'	6/7	Wet	Stiff		7.5'-8.0' Gravel 8.0'-9.0' Lt. Brown Silty Clay & Coarse Sand Slightly Impregnated @ 8.9' 9.0'-13.0' No Recovery
R-2 13.0'- 13.5'					13.0'-13.5' Gray to Blue-Green Clay; Trace Gravel
					BOB 13.5' Rock 13.5'

REMARKS Drilling Method - Auger

Casing - Temporary

BORING B-1

PAGE 1 OF 1

PROJECT Saad Waste Oil
PROJECT NO. 37069190499 BORING B-2
ELEVATION 580.3 DATE 3/19/87
FIELD GEOLOGIST Karmazinski

2 8 04/3

ample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'- 1.5'	23/25	Moist	Dense		0.0'-1.0' Dark Gray Gravel Fill
S-2 1.5'- 3.0'	7/5				1.0'-2.5' Dk.Gray Gravel Fill & Brown Sandy Clay, Mottled
S-3 3.0'- 4.5'	4/9		Stiff		2.5'-3.0' Gray Silty Clay - Slight Odor
S-4 4.5'- 6.0'	8/6		Stiff		3.0'-5.0' Greenish Brown Clayey Silt with Rotted Wood Debris
5.0' S-5 6.0'- 7.5'	8/3				
S-6 7.5'- 9.0'	3/5		M.Stiff		5.0'-15.2' Dk.Gray Clayey Silt - Some Sand, Slight Oily texture, Distinct Odor 6.0'to BOB, 7.4'-7.5' Clay Lense 7.5'-15.2' Increased Sand Concentration Downward with Sand Lenses
R-1 9.0'- 10.0' 14.0'	2/2		M.Stiff		
	4/1	Wet			
	1/1		V.Soft		
R-2 14.0'- 15.0' 17.5'-		▽			15.2'-17.2' Lt. Gray Silty Clay with Some Well Graded Sand
				BR	17.2'-17.5' Lt. Gray Weathered Sandstone
20.0'					BOB - Auger Refusal 17.5'

REMARKS Drilling Method - Auger
Casing - Temporary

BORING B-2

PAGE 1 OF 1

2 8 0474

PROJECT Saad Waste Oil
PROJECT NO. 37069190499 **BORING** B-3
ELEVATION 581.3 **DATE** 3/19/87
FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'-1.5'	9/15	Dry	M.Dense		0.0'-1.5' Dark Gray Gravel, Some Reddish Brown Sand & Clay Fill, 1.4'-1.5' Oil Impregnated
S-2 1.5'-3.0'	14/9				1.5'-3.0' Gray Gravel & Brown Sand, Slight Oil Stain, (Slight Odor)
S-3 3.0'-4.5'	22/39	Moist	V.Dense		3.0'-4.5' Dk. Gray Gravel and Brown Sand
S-4 4.5'-5'7"	12/49		V.Dense		4.5'-5'4" Dk.Gray Gravel and Reddish Brown Sandy Clay
	7/3		V.Dense		
	46/50/1"				Auger Refusal 5'4" (Not on Rock)

REMARKS Drilling Method - Auger
Casing - None Installed

BORING B-3

PAGE 1 **OF** 1

2 8 0475

PROJECT Saad Waste Oil
PROJECT NO. 37069190499 BORING B-4
ELEVATION 580.1 DATE 3/18/87
FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0					
S-1 0.0'-1.5'	7/7	Dry	Stiff		0.0'-1.0' Dark Gray Gravel & Brown Sand Fill
S-2 1.5'-3.0'	7/2				1.0'-1.5' Reddish Brown Sandy Clay
S-3 3.0'-5.0'	6/14	Moist	V.Stiff		1.5'-9'1" Reddish Brown Sandy Clay and Gravel
R-1 5.0'-7'4"	6/7		Stiff		4.0'-6.0' Oil Impregnated Zone
S-4 7'4"-9'4"	5/5	▽ Wet			
	/45				
	48/25		V.Dense		Auger Refusal 9'1"
10.0	14/				BOB 9'1" Rock 9'1"

REMARKS Drilling Method - Auger
Casing - Temporary

BORING B-4

PAGE 1 OF 1

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-5

ELEVATION 581.5 DATE 3/20/87

FIELD GEOLOGIST Karmazinski

2 8 04/9

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'- 5"	50/5"/	Dry	V.Dense		0.0'-4.0' Dark Gray Gravel
S-2 1.5'- 1'10"	/50/4"		V.Dense		
S-3 3.0'- 4.5'	40/34		V.Dense		
S-4 4.5'- 6.0'	25/15		M.Dense		4.0'-6.0' Dark Gray Gravel, Brown Clayey Silt and Sand
5.0' S-5 6.0'- 7.5'	4/3	Moist			6.0'-7.5' Brown Sandy Clay - Odor Present
S-6 7.5'- 9.0'	5/2		Stiff		7.5'-10.5' Oil Impregnated Sandy Clay and Gravel Grading to Oil Laden Gravel, Clay and Sand @ 8.0'
S-7 9.0'- 10.5'	4/7		Stiff		
10.0'	6/5	Wet			
10.5'- 14.5'	15/		V.Stiff		10.5'-14.5' No Recovery
15.0' R-2 14.5'- 19.5'					14.5'-15.0' Oil Laden Gravel 15.0'-17.5' Brown Clayey Silt, Some Sand and Gravel 17.5'-19.0' Brown Sandy Silt and Gravel 19.0'-19.5' Brown Clayey Silt and Sand
20.0'					Auger Refusal 19.5' BOB 19.5'

REMARKS Drilling Method - Auger

Casing - Temporary

BORING B-5

PAGE 1 OF 1

PROJECT Saad Waste Oil
PROJECT NO. 37069190499 **BORING** B-7
ELEVATION 582.1 **DATE** 3/21/87
FIELD GEOLOGIST Karmazinski

2 8 0477

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'-1.5'	32/16	Dry	M.Dense		0.0'-1.0' Dark Gray Gravel Fill
S-2 1.5'-3.0'	8/6				1.0'-1.5' Reddish Brown Clayey Silt
	9/19	Moist	M.Dense		1.5'-3.0' Reddish Brown Clayey Silt, Trace Sand and Gravel
5.0'		▽			Auger Refusal 3.0' Air Rotary Drilling to 10.0' No Return
10.0'					Rock 10.0' BOB 10.0'

REMARKS Drilling Methods - Auger to 3.0, Air Rotary to 10.0'
Casing - None Installed

BORING B-7

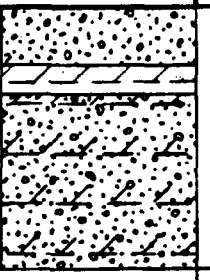
PAGE 1 **OF** 1

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-8

ELEVATION _____ DATE 3/21/87

FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0 S-1 0.0'-1.5'	23/28	Dry	Dense		0.0'-1.0' Dark Gray Gravel and Brown Sand, Some Oil Stain 1.0'-1.5' Reddish Brown Clayey Silt, Trace Sand, Mottled 1.5'-4.5' Reddish Brown Clayey Silt and Gravel; Trace Sand, Mottled 3.0'-4.5' Oil Impregnated
	21/38				
S-2 1.5'-2'10"	20/50/4"	Moist	Hard		
S-3 3.0'-4.5'	34/8		V.Stiff		
	20/				
5.0					Auger Refusal BOB 4.5' (Not on Rock)

REMARKS Drilling Method - Auger

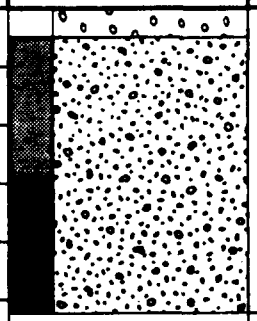
Casing - None Installed

BORING B-8

PAGE 1 OF 1

2 8 04'8

PROJECT Saad Waste Oil
PROJECT NO. 37069190499 BORING B-9
ELEVATION 581.5 DATE 3/21/87
FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'- 1.5'	15/18	Moist	Dense		0.0'-0.5' Dark Gray Gravel Fill 0.5'-5.25' Dark Gray Gravel and Sand Fill with Oil Stain
S-2 1.5'- 3.0'	19/8				
S-3 3.0'- 4.5'	30/12		Dense		
S-4 4.5'- 5.25'	30/14		M. Dense		3.0'-5.25' Red Paint or Dye on Split Barrel, Mixed with Oil
5.0'	50/3"/	Wet			Auger Refusal and BOB 5.25'
10.0'					

REMARKS Drilling Method - Auger
Casing - None Installed

BORING B-9

PAGE 1 OF 1

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-10

ELEVATION 582.0 DATE 3/21/87

FIELD GEOLOGIST Karmazinski

2 8 0430

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'-1.5'	8/4		M.Dense		0.0'-6'4" Dark Gray Gravel and Silty Clay, Trace Sand 0.0-1.5' - Dry Oil 1.5'-6'4"-Oil Concentration Increased with Depth
S-2 1.5'-3.0'	8/48				
S-3 3.0'-4.5'	16/30		Dense		
S-4 4.5'-6.0'	15/6		Loose		4.5'-6.0' Green Paint or Dye, Wood and Debris
5.0' S-5 6.0'-6'4"	4'/1/1'				
	1/1'/8		Loose		
	50/4"/				BOB and Auger Refusal 6'4" Not on Rock
10.0'					

REMARKS Drilling Method - Auger

Casing - None Installed

BORING B-10

PAGE 1 OF 1

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-11

ELEVATION 582.2 DATE 3/22/87

FIELD GEOLOGIST Karmazinski

2 8 0421

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'-1.5'	16/29	Moist	Dense		0.0'-4.5' Dark Gray Gravel Fill and Clayey Silt, Some Sand, Dry Oil Impregnated
S-2 1.5'-1'11"	10/50/5"		V.Dense		
S-3 3.0'-4.5'	39/6		M.Dense		
S-4 4.5'-6.0'	8/5		Loose		4.5'-7.5' No Recovery
S-5 6.0'-6.5'	3/5	▽			
S-6 7.5'-9.0'	2/50/0"		V.Dense		7.5'-8.7' Oil Laden Clayey Silt
R-1 9.0'-14.0'		Wet			8.7'-9.0' Oil Laden Sand 9.0'-12.5' Oil Laden Clayey Silt and Gravel, Some Sand Bottom of Oil Laden Zone 12.5'
R-2 14.0'-17.8'					12.5'-17'8" Brown Clayey Silt with Sand Lenses, Some Oil Stain
					Rock 17'8" BOB 17'8"

REMARKS Drilling Method - Auger

Casing - Well Installed

BORING B-11

PAGE 1 OF 1

PROJECT Saad Waste Oil

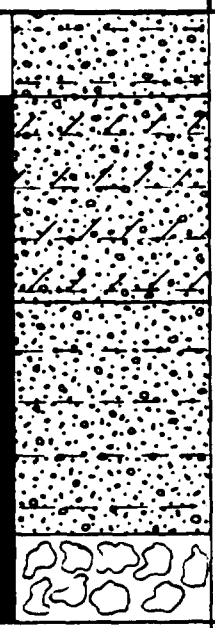
PROJECT NO. 37069190499 **BORING** B-12

ELEVATION 581.8 **DATE** 3/21/87

FIELD GEOLOGIST Karmazinski

2 8

0432

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0'					
S-1 0.0'- 1.5'	16/22	Dry	Dense		0.0'-1.5' Dark Gray Gravel Fill and Brown Sandy Silt 1.3'-5.0' Dry Oil Stain
S-2 1.5'- 3.0'	15/41	Moist	M.Dense		1.5'-5.0' Dark Gray Gravel and Clayey Silt, Some Sand
S-3 3.0'- 3.75'	10/50/3"		V.Dense		
S-4 4.5'- 4'11"	/50/5"		V.Dense		
5.0'					
S-5 6.0'- 7.5'	9/18	▽ Wet	M.Dense		5.0'-9.0' Gravel, Sand and Silt; Heavily Oil Laden, Minimal Recovery
S-6 7.5"- 9.0'	2/10				
	29/17		Dense		9.0'-10'5" Boulders
10.0'					
S-7 10.0'- 10'5"	50/5"/		V.Dense		BOB and Auger Refusal 10.5' Not on Rock
15.0'					

REMARKS Drilling Method - Auger

Casing - None Installed

BORING B-12

PAGE 1 **OF** 1

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-13

ELEVATION _____ DATE 3/24/87

FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'-1.5'	7/27	Dry	V.Dense		0.0'-4.0' Dark Gray Gravel, Sand and Silt Fill, Oil Laden
S-2 1.5'-3.0'	28/17	Wet	V.Dense		
S-3 3.0'-4.25'	11/12		V.Dense		
S-4 4.5'-6.0'	50/3"/6		Stiff		4.0'-4.5' Reddish Brown Clayey Silt and Gravel, Trace Oil
5.0' S-5 6.0'-7.5'	8/5		Stiff		4.5'-11.5' Oil Impregnated Gray Clayey Silt and Gravel with Sand Lenses Increased Clayey Silt Content Downward
S-6 7.5'-9.0'	4/5				8.9'-9.0' Free Product Zone
S-7 9.0'-10.5'	6/2		Soft		
10.0' S-8 10.5'-10'11"	1/50/4"		Hard		
	1/50/5"		Hard		11.5' Auger Refusal Air Rotary Drilling 11.5'-20'1" No Return
15.0'					
20.0'					Rock 20'1" BOB 20'1"

REMARKS Drilling Methods - Auger to 11.5', Air Rotary to 20'1"

Casing - None Installed

BORING B-13

PAGE 1 OF 1

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-14

ELEVATION 581.4 DATE 3/18/87

FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'-1.5'	5/15	Damp	M.Dense		0.0'-1.5' Dark Gray Gravel
S-2 1.5'-3.0'	9/10	▽ Wet	M.Dense		1.5'-4'1" Dark Gray Gravel, Some Sand and Clay (Brown) Distinct Odor, No Product
S-3 3.0'-4'1"	7/8		V. Dense		
	50/1"/				
5.0'					Auger Refusal 4'5" Not on Rock
					Air Rotary Drilling to 20.0'
10.0'					
15.0'					
20.0'					Rock 20.0' BOB 20.0'

REMARKS Drilling Methods - Auger to 4'5", Air Rotary to 20.0'

Casing - Well Installed

BORING B-14

PAGE 1 OF 1

2 8 C434

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-15

ELEVATION 581.8 DATE 3/18/87

FIELD GEOLOGIST Karmazinski

2 8 0485

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'-	7/12	Dry	V.Dense		0.0'-1.0' Dark Gray Gravel
1'11" S-2	50/5" / 50/3"		V.Dense		1.0'-2.25' Dark Gray Gravel and Reddish Brown Sand and Clay
1.5'- 1.75'					BOB 2.25' Rock 2.25'
-					
5.0'					

REMARKS Drilling Method - Auger

Casing - None Installed

BORING B-15

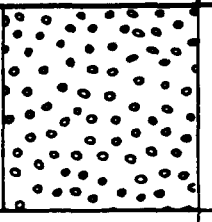
PAGE 1 OF 1

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-16

ELEVATION 581.4 DATE 3/18/87

FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'-1.25'	12/14	Dry	V.Dense		0.0'-3.5' Dark Gray Gravel
S-2 1.5'-1'10"	50/3" / 50/4"		V.Dense		
S-3 3.5'	/50/0"				BOB 3.5' Rock 3.5'
5.0'					

REMARKS Drilling Method - Auger

Casing - None Installed

BORING B-16

PAGE 1 OF 1

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-17

ELEVATION 578.7 DATE 3/19/87

FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0' S-1 0.0'-1.5'	2/4	Moist	Stiff		0.0'-3.0' Reddish Brown Clayey Silt; Some Sand and Gravel Fill
S-2 1.5'-3.0'	6/11		V.Stiff		Auger Refusal @ 3.0'
		▽			3.0'-14.25' Air Rotary Drilling
5.0'					No Return
10.0'					0.5' Void @ 13.25'
					Rock @ 13.75'
15.0'					BOB 14.25'

REMARKS Drilling Methods - Auger to 3.0', Air Rotary to 14.25'

Casing - None Installed

BORING B-17

PAGE 1 OF 1

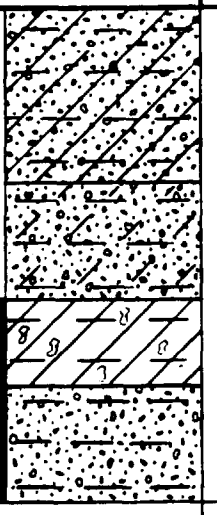
28 0437

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 **BORING** B-18

ELEVATION 581.8 **DATE** 3/19/87

FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'-1.5'	9/12	Dry	M.Dense		0.0'-3.0' Dark Gray Gravel Fill and Reddish Brown Silty Clay, Some Sand
S-2 1.5'-3.0'	9/12				
	13/14		M.Dense		
S-3 3.0'-4.5'	1/4	Moist	M.Dense		3.0'-5.0' Reddish Brown Sandy Silt; Some Clay and Trace Med. Gray Gravel
S-4 4.5'-6.0'	8/8				
R-1 6.0'-8.5'	10/12	Wet	M.Dense		5.0'-6.5' Debris-Wood and Reddish Brown Silty Clay, Some Oil Staining and Odor
					6.5'-8.5' Gravel and Sand, Trace Silt and Clay, Oil
					BOB 8.5'
					Rock 8.5'

REMARKS Drilling Method - Auger

Casing - Well Installed

BORING B-18

PAGE 1 **OF** 1

2 8 0488

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-19

ELEVATION 580.3 DATE 3/20/87

FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'-1.5'	16/13 15/	Dry	M.Dense		0.0'-1.0' Dark Gray Gravel Fill 1.0'-1.5' Dark Gray Gravel and Brown Clayey Silt Fill Auger Refusal 1.5' 1.5'-3.5' Boulder Zone 3.5'-7.5' Gray Clayey Silt, Trace Sand Air Rotary 1.5'-16.5' 7.5'-16.5' Reddish Brown Clayey Silt, Some Sand Rock 16.5' BOB 18.0'

0.0'
5.0'
10.0'
15.0'
20.0'

REMARKS Drilling Methods - Auger to 1.5', Air Rotary to 16.5'

Casing - Temporary

BORING B-19

PAGE 1 OF 1

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-20

ELEVATION 581.1 DATE 3/20/87

FIELD GEOLOGIST Karmazinski

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'-1.5'	3/15	Damp	V. Stiff		0.0'-0.5' Dark Gray Gravel Fill 0.5'-6.0' Reddish Brown Clayey Silt and Dark Gray Gravel Fill, Mottled
S-2 1.5'-3.0'	15/9		V.Stiff		
S-3 3.0'-4.5'	27/29		V.Stiff		
S-4 4.5'-6.0'	26/14		Stiff		
	/9				Auger Refusal 6.0' Air Rotary Drilling 6.0'-15.0' No Return
					BOB 15.0' Rock 15.0"

REMARKS Drilling Methods - Auger to 6.0', Air Rotary to 15.0'

Casing - Temporary

BORING B-20

PAGE 1 OF 1

28 0490

PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-21

ELEVATION _____ DATE 3/21/87

FIELD GEOLOGIST Karmazinski

2 8 0491

ample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'- 11"	12/50/5"	Dry	V.Dense		0.0'-2.75' Dark Gray Gravel Fill
S-2 1.5'- 2.75'	/14	Wet	V.Dense		Auger Refusal @ 2.75'
	38/50/3"				Air Rotary Drilling 2.75' - 18.0' No Return
					BOB 18.0' Rock 18.0'

0.0'
5.0'
10.0'
15.0'
20.0'

REMARKS Drilling Methods - Auger to 2.75', Air Rotary to 18.0'
Casing - Temporary

BORING B-21

PAGE 1 OF 1

APPENDIX C

9/86 SAMPLING PROGRAM LAB RESULTS

ENVIRESPONSE, INC.

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WATER ANALYSIS FOR SAAD WASTE OIL SITE

Nashville, TN

Project No. 3-70-69190499

October 23, 1986

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TABLE OF CONTENTS

SECTION V

Data for Base Neutral/Acid Extractables Analysis

SECTION VI

Data for Chlorides and Bromides Analysis

SECTION VII

Oil Fingerprinting Chromatograms

SECTION VIII

Service Laboratory Correspondence

SECTION IX

Chain of Custody Records

INTRODUCTION

On September 13, 1986, 10 water samples and one oil sample from the Saad Waste Oil Site in Nashville, Tennessee were received by Enviresponse, Inc. They were submitted to Clayton Environmental Consultants for priority pollutant volatile organics, PCB/Pesticides, and Base Neutral/Acid Extractables analyses plus chlorides, bromides, and 15 metals. In addition, oil fingerprinting analyses were performed.

PROCEDURES

All priority pollutant organics and metals analyses were conducted in accordance with Contract Lab Program (CLP) protocols. Method blank results for all priority pollutant parameters were below the required limit of detection.

Volatile Organics Analysis: All water samples were analyzed by purge and trap-GC/MS. The oil sample was dissolved in methanol and a portion of the methanol was injected into water for purge and trap-GC/MS analysis.

PCB/Pesticides Analysis: Water samples were serially extracted with methylene chloride, concentrated to a final volume of 1 ml, and solvent exchanged with iso-octane. The oil sample was dissolved in iso-octane. All samples were analyzed by electron capture detector-gas chromatography (ECD-GC). GC/MS confirmation was not performed for sample parameters which were undetected or below the method detection limit for GC/MS. Confirmation of PCBs in sample 7334, oil and water, were performed using capillary column ECD-GC.

Base Neutral/Acid Extractables: Water samples were serially extracted with methylene chloride after treatment with NaOH to raise the pH to 12. The water was then acidified to a pH less than 2 and serially extracted with methylene chloride. The extracts were combined and concentrated to a final volume of 1 ml. The oil sample was diluted with methylene chloride. Sample extracts were then analyzed by GC/MS.

Metals: The water samples were analyzed according to EPA Document 600-4-79-020, Methods for the Examination of Water and Wastewater. The oil sample was analyzed according to EPA Document SW 846, Method 3050, Test Methods for Evaluating Solid Waste.

Chlorides/Bromides: The analysis of the water samples was performed according to EPA Document 600-4-790-20, Method 300.1, Methods for the Examination of Water and Wastewater.

Oil Fingerprinting: The water samples were extracted with Freon prior to flame ionization detector-gas chromatography (FID-GC) analysis. The oil sample was diluted using Freon. No. 2 diesel fuel was diluted with Freon to various concentrations and analyzed by FID-GC. The chromatograms of the oil and water extracts were analyzed and compared to the diesel fuel chromatograms.

Results and detection limits for the above described analyses are presented in Tables 1-11.

Table 1. Detection Limits for Volatile Organics Analysis

Parameter	Detection Limit (water) ug/l	Detection Limit (oil) ug/g
Chloromethane	10	50
Bromomethane	10	50
Vinyl Chloride	10	50
Chloroethane	10	50
Methylene Chloride	5	25
Trichlorofluoromethane	1	25
1,1-Dichloroethylene	5	25
1,1-Dichloroethane	5	25
Trans-1,2-Dichloroethylene	5	25
Chloroform	1	25
1,2-Dichloroethane	5	25
1,1,1-Trichloroethane	5	25
Carbon Tetrachloride	5	25
Bromodichloromethane	5	25
1,2-Dichloropropane	7	35
Trans-1,3-Dichloropropylene	5	25
Trichloroethylene	5	25
Dibromochloromethane	5	25
1,1,2-Trichloroethane	5	25
Benzene	5	25
cis-1,3-Dichloroporpane	5	25
2-Chloroethylvinyl ether	10	50
Bromoform	5	25
Tetrachloroethylene	5	25
Toluene	1	25
Chlorobenzene	5	25
Ethylbenzene	5	25
1,3-Dichlorobenzene	15	75
1,4-Dichlorobenzene	15	75
1,2-Dichlorobenzene	7	35

Table 2. Results of Volatile Organics Analysis

Sample No.	Parameter	Concentration
Water		(reported as ug/l)
7331	Trichloroethylene	<5
7332	None Detected	---
7333	None Detected	---
7334	Vinyl chloride	9800
	Methylene chloride	5500
	1,1-Dichloroethane	1700
	Trans-,2-dichloroethylene	52000
	1,1,1-Trichloroethane	6300
	Trichloroethylene	30000
	Tetrachloroethylene	9600
	Toluene	4600
	Ethyl benzene	500
7335	Chloroform	<1
	Toluene	<1
7341	Chloroethane	130
	Methylene chloride	6.0
	1,1-Dichloroethane	8.0
7342	None Detected	---
7344	Trans-1,2-dichloroethylene	<5
	Tetrachloroethylene	6.0
7345	Trans-1,2-dichloroethylene	<5
	Trichloroethylene	7.0
	Tetrachloroethylene	6.0
7346	Trans-1,2-dichloroethylene	<5
	Toluene	<5
7353	None Detected	---

Table 2. Results of Volatile Organics Analysis (Cont'd)

Sample No.	Parameter	Concentration
Oil		(reported as ug/g)
7334	Vinyl chloride	290.
	Methylene chloride	670.
	1,1-Dichloroethane	130
	Trans-1,2-dichloroethylene	4200.
	1,1,1-Trichloroethane	1700.
	Trichloroethylene	4800
	Tetrachloroethylene	4800.
	Toluene	1300.
	Ehtyl benzene	230.

Table 3. Detection Limits for PCB/Pesticides Analysis

Parameter	Detection Limit (water) ug/l	Detection Limit (oil) ug/kg
α BHC	.05	78
β BHC	.05	78
δ BHC	.05	78
Δ BHC (Lindane)	.05	78
Heptachlor	.05	78
Aldrin	.05	78
Heptachlor Epoxide	.05	78
Endosulfan I	.05	78
Dieldrin	.10	160
4,4'-DDE	.10	160
Endrin	.10	160
Endosulfan II	.10	160
4,4'-DDD	.10	160
Endosulfan Sulfate	.10	160
4,4'-DDT	.10	160
Methoxychlor	.50	780
Endrin Ketone	.10	160
Chlordane	.50	780
Toxaphene	1.0	1600
Aroclor 1016	.50	780
Aroclor 1221	.50	780
Aroclor 1232	.50	780
Aroclor 1242	.5	780
Aroclor 1248	.5	780
Aroclor 1254	1.0	1600
Aroclor 1260	1.0	1600

Table 4. Results of PCB/Pesticides Analysis

Sample No.	Parameter	Concentration
Water		(reported as ug/l)
7332	None Detected	---
7333	None Detected	---
7334	Aroclor 1242 Aroclor 1260	130. 74
7335	None Detected	---
7341	None Detected	---
7342	None Detected	---
7344	None Detected	---
7346	None Detected	---
7353	None Detected	---
Oil		(reported as ug/g)
7334	Aroclor 1242 Aroclor 1260	36.0 17.0

Table 5. Detection Limits for Base Neutral/Acid Extractables Analysis

Parameter	Detection Limit (water) ug/l	Detection Limit (oil) ug/kg
N-nitrosodimethylamine	11	120
Phenol	10	110
bis(2-chloroethyl)ether	10	110
2-Chlorophenol	10	110
1,3-Dichlorobenzene	10	110
1,4-Dichlorobenzene	10	110
1,2-Dichlorobenzene	10	110
bis(2-Chloroisopropyl)ether	10	110
N-nitroso-di-n-propylamine	10	110
Hexachloroethane	10	110
Nitrobenzene	10	110
Isophorone	10	110
2-Nitrophenol	10	110
2,4-Dimethylphenol	10	150
bis(2-Chloroethoxy)methane	10	110
2,4-Dichlorophenol	10	110
1,2,4-Trichlorobenzene	10	110
Naphthalene	10	150
Hexachlorobutadiene	10	110
2,4,6-Trichlorophenol	10	110
2-Chloronaphthalene	10	110
Dimethyl phthalate	10	110
Acenaphthylene	10	110
Acenaphthene	10	110
2,4-Dinitrophenol	50	560
4-Nitrophenol	50	560
2,4-Dinitrotoluene	10	110
2,6-Dinitrotoluene	10	110
Diethylphthalate	10	110
4-Chlorophenyl-phenylether	10	110
Fluorene	10	110
4,6-Dinitro-2-methylphenol	50	560
N-Nitrosodiphenylamine	10	110
4-Bromophenyl-phenylether	10	110
Hexachlorobenzene	10	110
Pentachlorophenol	50	560
Phenanthrene	10	110
Anthracene	10	110
Di-n-butylphthalate	10	110
Fluoranthene	10	110
Benzidene	160	1800
Pyrene	10	110
Butylbenzylphthalate	10	110
3,3'-Dichlorobenzidene	28	310

Table 5. Detection Limits for Base Neutral/Acid Extractables Analysis (Cont'd)

Parameter	Detection Limit (water) ug/l	Detection Limit (oil) ug/kg
Benzo(a)anthracene	10	110.
bis(2-ethylhexyl)phthalate	10	110
Chrysene	10	110.
Di-n-octylphthalate	10	110.
Benzo(b)fluoranthene	11	120.
Benzo(k)fluoranthene	10	110.
Benzo(a)pyrene	10	110.
Indeno(1,2,3-cd)pyrene	13	150.
Dibenzo(a,h)anthracene	16	180.
Benzo(g,h,i)perylene	17	190

Table 6. Results for Base Neutral/Acid Extractables Analysis

Sample No.	Parameter	Concentration
Waters		reported as ug/l
7332	Diethylphthalate*,**	<10.
	bis(2-ethylhexyl)phthalate	78.
7333	Diethylphthalate*,**	<10.
	Di-n-butylphthalate*,**	<10.
7334	Phenol	1900.
	2,4-Dimethylphenol	4900.
	Napthalene**	150.
	4-Chloro-3-methylphenol**	160.
	bis(2-ethyl hexyl)phthalate	180.
7335	None Detected	--
7341	Diethylphthalate*,**	< 10.
	bis(2-ethylhexyl)phthalate	22.
	Di-n-octylphthalate**	< 10
7342	Diethylphthalate	<10
7344	Diethylphthalate*,**	<10
	bis(2-ethylhexyl)phthalate	<10
7345	Di-n-butylphthalate**	<10
	bis(2-ethylhexyl)phthalate	72.
7346	Diethylphthalate*,**	<10
7353	Phenol**	<10
	Fluorene**	<10
	Butylbenzylphthalate	12.
	bis(2-ethylhexyl)phthalate	<10
	Di-n-octyl phthalate	<10

* Compound was also detected in the method blank.
** Value is below the limit of quantification.

Table 6. Results for Base Neutral/Acid Extractables Analysis (Cont'd)

Sample No.	Parameter	Concentration
Oil		reported as ug/g
7334	Naphthalene	150
	2,4-Dimethylphenol	150
	Hexachlorobutadiene**	20
	Fluorene**	24
	Phenanthrene**	92
	Anthracene**	11
	Fluoranthene**	18
	Pyrene**	18
	Butylbenzylphthalate**	27
	Bis(2-ethyl hexyl)phthalate	410

*Compound was also found in the method blank.

**Value is approxmate due to its proximity to the detection limit.

Table 7. Detection Limits for Metals Analysis

(Concentration reported as mg/l)

Parameter	Total Concentration	Dissolved Concentration
Arsenic	.001	NA
Aluminum	.10	.20
Barium	.03	NA
Beryllium	.003	NA
Boron	2.0	NA
Cadmium	.003	NA
Chromium	.005	NA
Copper	.005	NA
Iron	.005	.01
Lead	.02	NA
Manganese	.005	.01
Nickel	.01	NA
Selenium	.002	NA
Vanadium	.10	NA
Zinc	.005	NA

NA denotes not analyzed

Table 8. Results of Total Metals Analysis - Waters

Concentrations reported in mg/l

Parameter	Sample No.									
	7346 (Blank)	7332	7333	7334	7335	7353	7341	7342	7344	7345
Arsenic	ND	.003	ND	.14	ND	.012	.008	.001	ND	ND
Aluminum	ND	7.8	.10	.20	.10	6.5	4.1	.40	.20	.20
Barium	.060	.11	ND	.44	ND	.10	.090	ND	ND	ND
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron	3.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	.009	.009	.007	.026	.006	.008	.005	.005	.006	.006
Chromium	ND	.019	ND	.005	ND	.016	.030	ND	ND	ND
Copper	.010	.032	.011	.016	.010	.033	.021	.011	.010	.007
Iron	.30	7.4	.84	38.	.30	9.3	20.	1.2	.18	.35
Lead	.12	.10	.080	.080	.060	.090	.080	.060	.080	.060
Manganese	.017	1.8	1.7	31.	.019	1.4	1.9	.74	.065	.065
Nickel	.020	.080	.050	.11	.030	.050	.080	.020	.030	.030
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	.018	.091	.025	.043	.017	6.5	4.1	.40	.20	.20

ND denotes not detected

Table 8. Results of Metals Analysis - Oil

(Concentrations reported as ug/g)

Sample No. 7334

Parameter	Concentration	Detection Limit
Aluminum	1000	50.
Arsenic	8.4	.50
Barium	54.	15.
Beryllium	ND	2.0
Boron	ND	750
Cadmium	4.0	2.0
Chromium	30.	3.0
Copper	7	3.0
Iron	711	3.0
Lead	23.	10.
Manganese	78.	3.0
Nickel	5.5	5.0
Selenium	ND	1.0
Vanadium	ND	50.
Zinc	44.	3.0

ND denotes not detected

Table 9. Results of Dissolved Metals Analysis

Concentrations in mg/l

Parameter	Sample No.								
	7346 (Blank)	7332	7333	7335	7353	7341	7342	7344	7345
Aluminum	ND	.30	ND	ND	ND	ND	ND	.30	ND
Manganese	.020	.050	1.8	.030	1.3	1.8	.12	.080	.070
Iron	.20	.34	.58	.17	1.0	1.7	.27	.38	.22

ND denotes not detected

Table 10. Results of Chlorides and Bromides Analysis

(Concentrations in mg/l)

Sample No.	Chlorides	Bromides
Method Blank	ND	ND
7332	4.0	ND
7333	11.	ND
7334	310	11.
7335	6.4	ND
7341	22.	ND
7342	64	ND
7344	11.	ND
7345	11.	ND
7346	ND	ND
7353	10.	ND

ND denotes not detected. Detection limits were .5 mg/l for chlorides and 1.0 ug/l for bromides.

Table 11. Matching of Oil Fingerprinting Analysis to Diesel Fuel No. 2

Sample No.	Results
Method Blank	Negative
7332	Negative
7333	Negative
7334 (water)	Positive
7334 (oil)	Positive
7335	Negative
7341	Negative
7342	Negative
7344	Negative
7345	Negative
7346	Negative
7353	Negative

QA/QC PROCEDURES

Volatile Organics Analysis: Three surrogate standards were spiked into each sample prior to analysis to ensure the efficiency of the purge and trap unit. Recoveries for these standards are presented in QA/QC Table 12. The recoveries for water ranged from 85% - 106% and for the oil sample from 84% - 106%.

One water sample (7331) and the oil sample (7334) were analyzed in duplicate to determine sample homogeneity. The results are presented in QA/QC Table 13. Methylene chloride was detected in the water sample but not in the duplicate. Methylene chloride was also detected in the method blank. This is a common laboratory solvent and is often seen as contamination during sample analysis. Its presence at detection limit levels in one sample and not in a duplicate can be disregarded since the background in a laboratory can vary. The relative percent differences for the oil sample ranged from 0 to 16 indicating good sample homogeneity.

A water sample, 7346, and the oil sample, 7334, were spiked with five volatile organics to determine any matrix interferences that may be present. These results are listed in QA/QC Table 14. Recoveries ranged from 86% - 106% for the water and from 90% - 120% for the oil and were within the QA/QC limits for this laboratory.

PCB/Pesticides Analysis: All water samples and standards were spiked with dibutyl chlorendate to assure proper instrument performance. These surrogate standard results are presented in QA/QC Table 15. The recovery for two samples, 7332, its duplicate, and 7334, could not be calculated due to a contamination peak that coeluted with dibutyl clorendate. All other recoveries were within the QA/QC limits of the laboratory. CLP protocols do not require surrogate spiking for oil matrices.

One water sample, 7332, was analyzed in duplicate to determine sample homogeneity. PCBs and pesticides were undetected in both. The oil sample, 7334, was also analyzed in duplicate. Results for the oil sample are presented in QA/QC Table 16. The relative percent difference for Aroclor 1242 and Aroclor 1260 were 2.8 and 6.1, respectively.

One water sample was spiked with six pesticides to determine the presence of matrix interferences. Results are presented in QA/QC Table 17. All compounds except 4,4'-DDT were within the laboratory's QA/QC limits.

Base Neutral/Acid Extractables Analysis: All water samples and method blanks were spiked with three surrogate standards to ensure extraction efficiency. The results are presented in QA/QC Table 18. Surrogate spiking was not required for the oil sample since the sample preparation does not include an extraction process. Recoveries for water sample 7334 could not be determined due to high levels of phenol and 2,4-dimethyl phenol which required dilution of the extract prior to analysis. All other surrogate standard recoveries were within the QA/QC limits of the laboratory.

The results of duplicate analyses of water sample 7332 and oil sample 7334 are presented in QA/QC Table 19. Relative percent difference for diethylphthalate was not calculated because its concentration was less than the method limit of quantification. Bis(2-ethylhexyl)phthalate was found at 78 ug/l in the sample but undetected in the duplicate. Reproducibility for three compounds above the limit of quantification found in the oil sample ranged from 0-6.4 relative percent difference.

Results of the matrix spike analysis for water sample 7346 and the oil sample are presented in QA/QC Table 20. All recoveries were within the QA/QC limits of the laboratory.

Metals Analysis: The results of duplicate metals analyses are presented in QA/QC Table 21. Relative percent differences for the water ranged from 0-26. For the oil sample, relative percent difference ranged from 0 to 25.

One water sample was spiked with fifteen metals to determine any matrix interferences. Results are presented in QA/QC Table 22. Recoveries ranged from 93-134%. The oil sample was also spiked with fifteen metals as shown in QA/QC Table 22. Recoveries ranged from 61 to 112% for all compounds except selenium. Recovery for selenium was 3%. Historical data for selenium in oil indicates low recoveries are usual.

Chlorides/Bromides Analysis: Duplicate chlorides and bromides results are presented in QA/QC Table 23. Water sample 7341 was analyzed in duplicate and showed no relative percent difference for chlorides. Bromides were undetected in the sample and duplicate.

Matrix spike results for chlorides and bromides are presented in QA/QC Table 24. One sample, 7341, was spiked with both analytes and two other water samples, 7344 and 7335, were spiked with chlorides and bromides, respectively. Recoveries ranged from 96-110%.

Oil Fingerprinting: Two deionized water samples were spiked with 5 ul of pure diesel fuel oil to determine extraction efficiency. Quantification of the oil was performed by selecting the twelve highest peak area responses and comparing to a diesel fuel standard. Recoveries were 110% and 114%.

QA/QC Table 12. Surrogate Standard Recoveries for Volatile Organic Analysis

Sample No.	% Recovery Toluene-D8	4-Bromofluorobenzene	1,2-Dichloroethane-D4
Water			
7331	103.	106.	99.
7332	101.	98.	102.
7332 (Duplicate)	101.	100.	102
7333	96.	100.	97.
7334 (water)	94.	100.	99.
7335	101.	98.	97.
7341	91.	106.	101.
7342	98.	100.	93.
7344	105.	101.	93.
7345	100.	102.	92.
7346	102.	99.	100.
7353	99.	102.	85.
7346 MS	99.	99.	100.
Method Blank I	98.	101.	101.
Method Blank II	100.	104.	90.
Method Blank III	101.	103.	95.
Oil			
7334	87.	98.	95.
7334 MS	97.	104.	87.
7334 (Duplicate)	102	106.	84.
Method Blank	93.	107.	86.

QA/QC Table 13. Results of Duplicate Volatile Organics Analysis

Parameter	Run 1	Run 2	RPD
Sample No. 7331 (water) - Concentrations reported as ug/l			
Methylene chloride	<5	ND	--
Sample No. 7334 (oil) - Concentrations reported as ug/g			
Vinyl chloride	290.	300.	3.4
Methylene chloride	670.	570.	16.
1,1-Dichloroethane	130.	130.	0.
Trans-1,2-dichloroethylene	4200.	4000.	4.9
1,1,1-Trichloroethane	1700.	1700.	0
Trichloroethylene	4800.	4900.	2.1
Tetrachloroethylene	4800.	5600.	15.
Toluene	1300.	1400.	7.4
Ethyl benzene	230.	270.	16.

RPD denotes relative percent difference

QA/QC Table 14. Results of Matrix Spike Volatile Organics Analysis

Parameter	Spike Conc.	Sample Conc.	Recovered Conc.	% Recovery
Sample No. 7346 (water) - concentrations reported as ug/l				
1,1-Dichloroethane	50.	ND	43.	86.
Trichloroethylene	50.	ND	52.	104.
Chlorobenzene	50.	ND	51.	102.
Toluene	50.	.6	50.	99.
Benzene	50.	ND	53.	106.
Sample 7334 (oil) - concentrations reported as ug/g				
1,1-Dichloroethane	3100	ND	2800	90.
Trichloroethylene	3100	4800	8500	120.
Chlorobenzene	3100	ND	3300	106.
Toluene	3100	1300	4500	103.
Benzene	3100	ND	2900	94.

QA/QC Table 15. Surrogate Standard Recoveries for PCB/Pesticides Analysis

Sample No.	Parameter	% Recovery
7332	Dibutyl Chlorendate	*
7332 Duplicate	Dibutyl Chlorendate	*
7333	Dibutyl Chlorendate	97.0
7334	Dibutyl Chlorendate	*
7335	Dibutyl Chlorendate	88.0
7341	Dibutyl Chlorendate	53.0
7342	Dibutyl Chlorendate	86.0
7344	Dibutyl Chlorendate	91.0
7345	Dibutyl Chlorendate	90.0
7346	Dibutyl Chlorendate	102.0
7346 MS	Dibutyl Chlorendate	86.0
7353	Dibutyl Chlorendate	101.0
Method Blank	Dibutyl Chlorendate	93.0

*Surrogate standard recovery could not be calculated due to coelution of dibutyl chlorendate with interference peak.

QA/QC Table 16. Results of Duplicate PCB/Pesticides Analysis

Concentrations in ug/g

Parameter	Run 1	Run 2	RPD
Sample 7334 (Oil)			
Aroclor 1242	36.	35.	2.8
Aroclor 1260	17.	16.	1.06

RPD denotes relative percent difference

QA/QC Table 17. Results of Matrix Spike PCB/Pesticides Analysis

Concentrations reported as ug/l

Parameter	Spike Conc.	Sample Conc.	Recovered Conc.	% Recovery
Sample No. 7332 (water)				
Lindane	.20	ND	.19	95.
Heptachlor	.20	ND	.14	70.
Aldrin	.20	ND	.12	60.
Dieldrin	.50	ND	.43	86.
Endrin	.50	ND	.44	88.
4,4'-DDT	.50	ND	.66	130.

QA/QC Table 18. Surrogate Standard Recoveries for Base Neutral/Acid Extractables

Sample No.	% Recovery		
	2-Fluorophenol	2-Fluorobiphenyl	2,4,6-Tribromophenol
7332	50.	63.	48.
7332 (duplicate)	51.	59.	50.
7333	58.	66.	81.
7334 (water)	*	*	*
7334 (oil)	not required	not required	not required
7335	57.	80.	65.
7341	53.	76.	71.
7342	55.	69.	68.
7344	52.	78.	58.
7345	47	87.	62.
7346	62.	57.	96.
7346 MS	60.	65.	76.
7353	56.	66.	58.
Method Blank	59.	70.	82.

*Surrogate standards were diluted out due to high concentrations of phenol and 2,4-dimethylphenol in sample.

QA/QC Table 19. Results of Duplicate Base Neutral/Acid Extractables Analysis

Parameter	Run 1	Run 2	RPD
Sample 7332 (water) - concentrations reported as ug/l			
Diethylphthalate	<10	<10	--
Bis(2-ethylhexyl)phthalate	78	ND	--
Sample 7334 (oil) - concentrations reported as ug/g			
2,4-Dimethylphenol	150.	160.	6.4
Naphthalene	150.	150.	0
Hexachlorobutadiene	<110.	<110.	--
Fluorene	<110.	<110.	--
Phenanthrene	<110.	<110.	--
Anthracene	<110.	<110.	--
Fluoranthene	<110.	ND	--
Pyrene	<110.	<110.	--
Butylbenzylphthalate	<110.	<110.	--
Bis(2-ethylhexyl)phthalate	410.	400.	2.5

QA/QC Table 20. Results of Matrix Spike Base Neutral/Acid Extractables Analysis

Concentrations reported as ug/l

Sample 7346 water:

Parameter	Spike Conc.	Sample Conc.	Recovered Conc.	% Recovery
1,2,4-Trichlorobenzene	130	ND	69.	53.
Acenapthene	130	ND	89.	68.
2,4-Dinitrotoluene	130	ND	120	92.
Pyrene	130	ND	150	115
N-nitroso-di-n-propylamine	130	ND	89.	68.
1,4-Dichlorobenzene	130	ND	66.	51.
Pentachlorophenol	270	ND	240	89
Phenol	270	ND	120	44.
2-Chlorophenol	270	ND	200	73.
4-Chloro-3-methylphenol	270	ND	230	85.
4-Nitrophenol	270	ND	100	37.

QA/QC Table 21. Results of Duplicate Metals Analysis

Concentrations reported as mg/l

Parameter	Run 1	Run 2	RPD
Total Metals:	Sample No. 7335 (water)		
Arsenic	ND	ND	--
Aluminum	.1	.1	0
Barium	ND	ND	--
Beryllium	ND	ND	--
Boron	ND	ND	--
Cadmium	.006	.006	0
Chromium	ND	ND	--
Copper	.010	.008	22.
Iron	.30	.39	26.
Lead	.06	.06	0
Manganese	.019	.017	11.
Nickel	.03	.03	0
Selenium	ND	ND	--
Vanadium	ND	ND	--
Zinc	.017	.018	5.7
Dissolved Metals:	Sample 7341 (water)		
Manganese	1.8	1.8	0
Iron	1.7	1.7	0
Aluminum	ND	ND	--
Total Metals:	Sample 7334 (oil) - concentrations in ug/g		
Aluminum	8.4	8.2	2.4
Barium	54.	47.	4.7
Beryllium	ND	ND	--
Boron	ND	ND	--
Cadmium	4.0	4.0	0
Chromium	30.	31.	3.3
Copper	7.0	9.0	25.
Iron	711	710	.14
Lead	23.	22.	4.4
Manganese	78	94	19.
Nickel	5.5	5.4	1.8
Selenium	ND	ND	--
Vanadium	ND	ND	--
Zinc	44.	49.	11

QA/QC Table 22. Results of Matrix Spike for Metals Analysis

Parameter	% Recovery
Sample 7335 - Water	
Arsenic	95.
Aluminum	106
Barium	126
Beryllium	101
Boron	93.
Cadmium	95.
Chromium	94.
Copper	93.
Iron	93.
Lead	95.
Manganese	134
Nickel	113
Selenium	95.
Vanadium	126
Zinc	123
Sample 7334 - Oil	
Arsenic	61.
Aluminum	88.
Barium	112
Beryllium	66.
Boron	76.
Cadmium	94.
Chromium	107
Copper	100
Iron	78.
Lead	107
Manganese	100
Nickel	92.
Selenium	3.0
Vanadium	107
Zinc	89.

QA/QC Table 23. Results of Duplicate Chlorides and Bromides Analysis

Concentrations in mg/l

Sample No.	Chlorides			Bromides		
	Run 1	Run 2	RPD	Run 1	Run 2	RPD
7341	22.	22.	0	ND	ND	--

QA/QC Table 24. Results of Matrix Spike
for Chlorides and Bromides Analysis

Sample No.	% Recovery Chloride	% Recovery Bromides
7341	98.	110
7344	96.	---
7335	--	98.

POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

ENVIRESPONSE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NAME GRASSMERE

PROJECT NO.

SAMPLER(S) SIGNATURE

SAMPLE IDENTIFICATION	SAMPLING LOCATION	DATE SAMPLED	SAMPLE TYPE: WATER	SOIL	AIR	GAS	NO. OF CONTAINERS	PRESERVATIVE	TIME OF COLLECTION	FIELD MEASUREMENTS	TIME COLLECTION BEGAN	INITIAL	TIME COLLECTION COMPLETED	REMARKS
7332	WELL #2	9/												
7332	WELL #2													
7332	WELL #2	9/10/												
7332	WELL #2	10												
7331	WELL #2													

RELINQUISHED BY: NAME DATE/TIME RECEIVED BY: NAME

RELINQUISHED BY: NAME DATE/TIME RECEIVED BY: NAME

RELINQUISHED BY: NAME DATE/TIME RECEIVED BY: NAME

AUTHORIZATION FOR DISPOSAL DATE/TIME DISPOSED BY:

2 8 0526

ENVIRESPONSE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NAME GRASSMERE

PROJECT NO.

SAMPLER(S) SIGNATURE

SAMPLE IDENTIFICATION	SAMPLING LOCATION	DATE SAMPLED	SAMPLE TYPE									
			WATER/SOIL	AIR	SLUDGE							
7341	SS LN #1 RR											
7341	"											
7342	Log											
7342	"											
7344	Hatchery Dam											
7344												
7345	South Dam											
7345	"											

RELINQUISHED BY: NAME

RELINQUISHED BY: NAME

RELINQUISHED BY: NAME

AUTHORIZATION FOR DISPOSAL

0527

ENVIRONMENTAL INC.

CHAIN OF CUSTODY RECORD

SHEET NO. 1 OF 1

SAMPLER(S) SIGNATURE

SAMPLE I.D.	SAMPLE TYPE			DATE TO BE COLLECTED	NO. OF CONTAINERS	TIME COLLECTION BEGAN		DATE COLLECTION COMPLETED		COMMENTS

RECEIVED BY / AFFILIATION — DATE / TIME

RECEIVED BY / AFFILIATION — DATE / TIME

RECEIVED BY / AFFILIATION — DATE / TIME

RECEIVED BY / AFFILIATION — DATE / TIME

0528

28

ENVIRESPONSE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NAME Grad Dif Site

PROJECT NO. 370 67 1410499

SAMPLER(S) SIGNATURE [signature]

SAMPLE IDENTIFICATION	SAMPLING LOCATION	DATE SAMPLED	SAMPLE TYPE: WATER	SOLID	AIR	OIL	COMP	GRAB	VOLUME TO BE COLLECTED	NO. OF CONTAINERS	TIME COLLECTION BEGAN	INITIAL	TIME COLLECTION COMPLETED	INITIAL	COMMENTS
05714	B20	3/26/87	✓					✓	2x1L	2	0900	JD	0915	JD	PP, PESTICIDE/PCB
05714	B20	3/26/87	✓					✓	3x40mL	3	0900	JD	0915	JD	VOA
05713	B27	3/25/87	✓					✓	2x1L	2	1430	JD	1439	JD	PP, PESTICIDES/PCB
05713	B27	3/25/87	✓					✓	3x40mL	3	1430	JD	1439	JD	VOA
05712	KRAFT SPRING	3/24/87	✓					✓	2x1L	2	1045	JD	1100	JD	PP, PESTICIDE/PCB
05712	KRAFT SPRING	3/24/87	✓					✓	3x40mL	3	1045	JD	1100	JD	VOA
05715	B9	3/26/87	✓					✓	2x1L	2	1100	JD	1115	JD	PP, PESTICIDES/PCB
05715	B9	3/26/87	✓					✓	3x40mL	3	1100	JD	1115	JD	VOA

RELINQUISHED BY: NAME [signature] DATE/TIME 3/26/87 1415

RELINQUISHED BY: NAME _____ DATE/TIME _____

RELINQUISHED BY: NAME _____ DATE/TIME _____

AUTHORIZATION FOR DISPOSAL _____ DATE/TIME _____

RECEIVED BY: NAME _____ DATE/TIME _____

RECEIVED BY: NAME _____ DATE/TIME _____

RECEIVED BY: NAME _____ DATE/TIME _____

DISPOSED BY: _____ DATE/TIME _____

FORM NO. 1541-27

28 0529

ENVIRESPONSE, INC.

PROJECT NAME

PROJECT NO.

SAMPLE IDENTIFICATION	SAMPLING LOCATION	DATE SAMPLED	SAMPLE TYPE						
7334	SOIL								
7334	SOIL								
7334	" "								
7333	WATER SAMPLE								
7346	WATER BLANK								
7346	"								
7346	"								
7346	"								

RELINQUISHED BY: NAME

RELINQUISHED BY: NAME

RELINQUISHED BY: NAME

AUTHORIZATION FOR DISPOSAL

ENVIRESPONSE, INC.

PROJECT NAME 16 GRASSHOP

PROJECT NO.

SAMPLE IDENTIFICATION	SAMPLE LOCATION	REMARKS
7335		
7335		
7335		
7335		
7353	WELL	
7353	WELL	

RELINQUISHED BY: NAME

RELINQUISHED BY: NAME

RELINQUISHED BY: NAME

AUTHORIZATION FOR DISPOSAL

2 8 0532

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: GRASSMERE WELL #3

Collectors: CB PM

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 7353	Mo 09 Day 17 Yr 86	1530

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
	Loam
	Peat
	Color:

Depth ____ Ft. or In.

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15° < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.
Sample Depth ____ Ft.
Color:
Odor:
Oil:
Device: BAILER

SURFACE WATER

Color: ____ Temp ____
pH: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low ⟶ High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

FIELD DATA SHEET

2 8 0533

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

BLANK

Location: BLANK

Collectors: PM CB

Lab Number (Consec.#'s) NO 7346

Date Collected: Mo 11 Day 12 Yr 86

Time (24 hr): 0900

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
	Loam
	Peat
	Color:

Depth: Ft. or In.

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
< 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color:
Odor:
Oil:
Device:

SURFACE WATER

Color: Temp
Odor: pH

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low→High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

FIELD BLANK

2 8 0534

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: [redacted] Conduit from overpass, Runoff Soil

Collectors: GP, PLL, CW

Lab Number (Consec.#'s)	Date Collected			Time (24 hr)			
NO 7345	Mo 09	Day 12	Yr 86	0	8	4	6

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
< 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
(Farmland) — Commercial

Herbaceous 50 %
Shrubs 30 %
Trees 20 %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.
Sample Depth ____ Ft.
Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: clear Temp ____
Odor: none pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____
Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar 9	Low→High Concentration
Plastic Jar 9	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
(Wet Ice)
Ambient
Dry ice

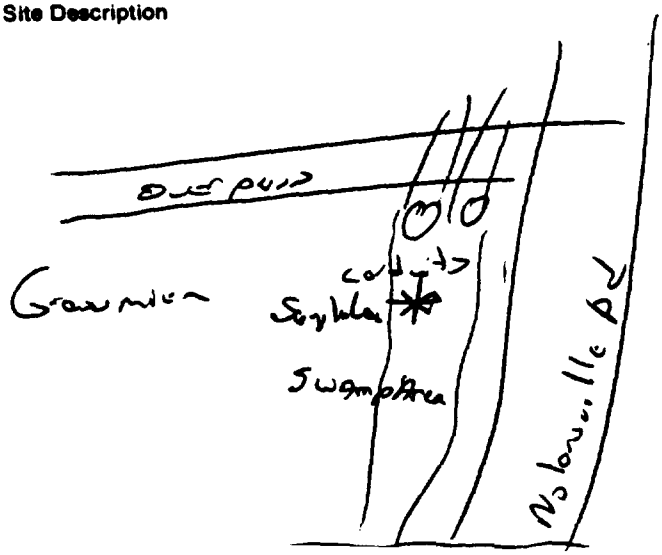
TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description



Duplicate

2 8 0535

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Sod Site

Collectors: PLK, GP, CW

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 7344	Mo 09 Day 12 Yr 86	1049

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
	Loam
	Peat
	Color:

Depth ____ Ft. or In.

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
Slope < 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
Farmland — Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color:
Odor:
Oil:
Device:

SURFACE WATER

Color: Clear Temp ~
Odor: — pH ~

STREAM Width ____ Ft.

Depth ____ Ft or In.

Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Mi. Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar —	Low → High Concentration
Plastic Jar —	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

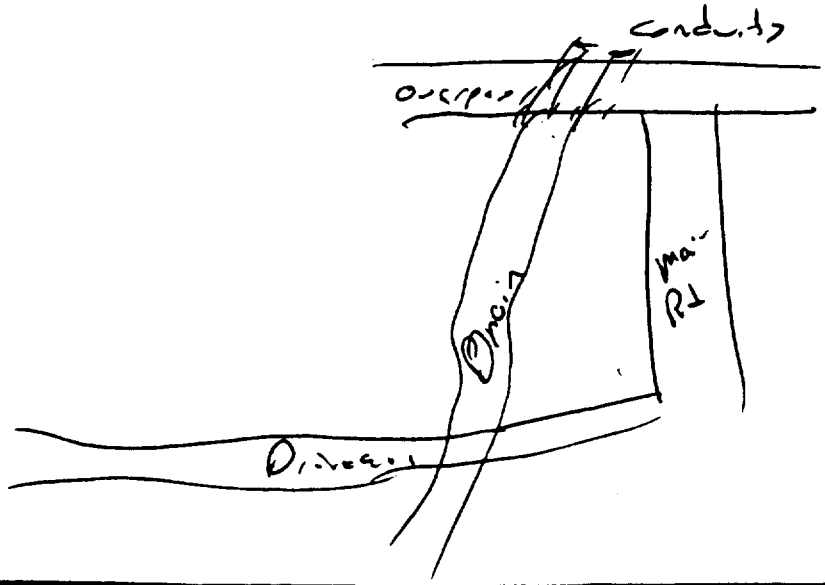
TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description



2 8 0536

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: SAAD WASTE OIL / CSX LAGOON

Collectors: WALSH/PRINCE

Lab Number (Consec.#'s): NO 7342

Date Collected: Mo 04 Day 12 Yr 86

Time (24 hr): 0921

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15° < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

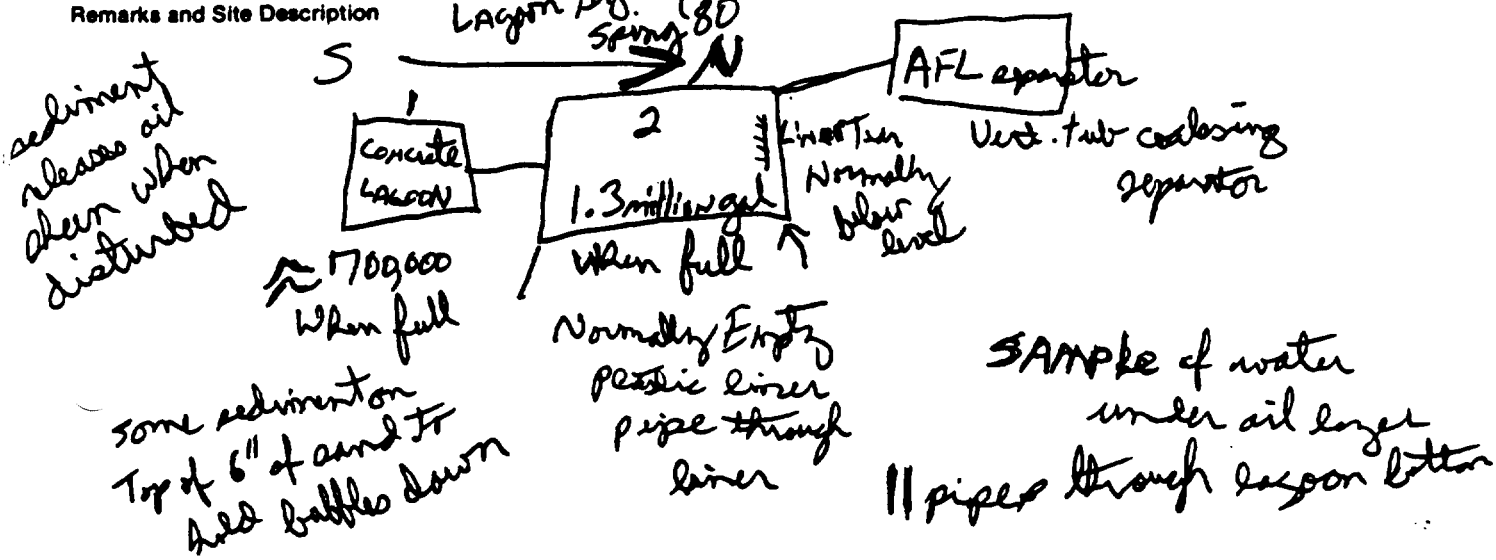
TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description



2 8 0537

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: SAAD Waste Oil - CSX Railroad

Collectors: _____

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 7341	Mo 09 Day 12 Yr 86	0800

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
	Loam
	Peat
	Color: _____

Depth: ____ Ft. or In.

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
< 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
Farmland — Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.
Sample Depth ____ Ft.
Color: _____
Odor: _____
Oil: _____
Device: _____

SURFACE WATER

Color: _____ Temp _____
Odor: _____ pH _____

SEAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION _____
Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

F.t Well SSLW#1

Depth on 9/11/86 TOC-Bottom 51.6'
TOC-WL 15.0'
Grnd-TOC 1.7'

2 8 0538

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: GRASSMERE NATURE PARK

Collectors: WALSH / PRINCE

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 7335	Mo 09 Day 11 Yr 86	1833

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
< 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
Farmland — Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.
Sample Depth ____ Ft.
Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____
Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

Spring 2 - 5 of entry road in spring box #2

Brick box 1½ ft high, pipe inside box

flow ≈ 9 gl/min

2 8 0539

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: SAAD OIL WELL

Collectors: PK GP

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 7334	Mo 09 Day 11 Yr 86	

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
Slope < 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
Farmland — Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.
Sample Depth ____ Ft.
Color: ____
Odor: ____
Oil: ____
Device: BAILER

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low ⟶ High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

oil and water phase.

2 8 0540

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: CROFT SPRING

Collectors: PK GP CW

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 7333	Mo 09 Day 11 Yr 86	

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
Depth ____ Ft. or In.	Loam
	Peat
	Color: ____

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
Slope < 15°

VEGETATION

Old Field — Residential
Wooded — Industrial
Farmland — Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: ____

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

2 8 0541

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: WECC * 2

Collectors: PJM PK CB

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 7332	Mo 11 Day 11 Yr 86	

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
	Loam
	Peat
	Color:

Depth ____ Ft. or In.

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15° < 15°

VEGETATION

Old Field	Residential
Wooded	Industrial
Farmland	Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth 285 Ft.

Sample Depth ____ Ft.

Color: ____
Odor: ____
Oil: ____
Device: Bailer

SURFACE WATER

Color: ____ Temp ____
or: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low→High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

PP ANALYSIS

2 8 0542

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: WELL #2-1

Collectors: C. BURCHETTE, P. KARMAZINSKI, P. MCNALLY

Lab Number (Consec.#'s)	Date Collected	Time (24 hr)
NO 7331	Mo 09 Day 11 Yr 86	0800

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
	Loam
	Peat
	Color:

Depth ____ Ft. or In.

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15° < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth 284 Ft.

Sample Depth ____ Ft.

Color:
Odor:
Oil:
Device: BAILER

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft.
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High Concentration
Plastic Jar	Detergent Wash
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____ Ft

Remarks and Site Description

P.P. VOA ANALYSIS

- WELL BAILED
- WOULD NOT RECHARGE

SHEET NO. 1 OF 1

ENVIRESPONSE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NAME GRASSMERE

PROJECT NO.

SAMPLER(S) SIGNATURE Paul McNally

SAMPLE IDENTIFICATION	SAMPLING LOCATION	DATE SAMPLED	SAMPLE TYPE: WATER	SOLID	AIR	OIL	COMP.	GRAB	VOLUME TO BE COLLECTED	NO. OF CONTAINERS	TIME COLLECTION BEGAN	INITIAL	TIME COLLECTION COMPLETED	INITIAL	COMMENTS
7341	SSLW #1 BR	9-12	✓					✓	1L	1	0800	PM	1700	PM	PP METALS
7341	"	9-12	✓					✓	250ml	1	0800	PM	1700	PM	AL, FE, MN
7342	Lagoon	9-12	✓					✓	1L	1	0800	PM	1700	PM	PP METALS
7342	"	9-12	✓					✓	250ml	1	0800	PM	1700	PM	AL, FE, MN
7344	Highway Drain	9-12	✓						1L	1	0800	PM	1700	PM	PP METALS
7344	"	9-12	✓						250ml	1	0800	PM	1700	PM	AL, FE, MN
7345	Site Drain	9-12	✓						1L	1	0800	PM	1700	PM	PP METALS
7345	"	9-12	✓						250ml	1	0800	PM	1700	PM	AL, FE, MN

RELINQUISHED BY: NAME _____ DATE/TIME _____ RECEIVED BY: NAME _____ DATE/TIME _____

RELINQUISHED BY: NAME _____ DATE/TIME _____ RECEIVED BY: NAME _____ DATE/TIME _____

RELINQUISHED BY: NAME _____ DATE/TIME _____ RECEIVED BY: NAME _____ DATE/TIME _____

AUTHORIZATION FOR DISPOSAL _____ DATE/TIME _____ DISPOSED BY: _____ DATE/TIME _____

APPENDIX D

MONITORING WELL INSTALLATION DETAILS

NUS CORPORATION

2 8 0545

FIELD WELL COMPLETION FORM

JOB NAME: Saad Waste Oil

JOB NUMBER: | PROJECT MANAGER: Karmazinski

LOGGED BY: McWally | EDITED BY: Karmazinski

WELL NAME: MW-11 | DATE: 3/25/87

DRILLING COMPANY: GeoTek

EQUIPMENT: ☐ 6¼ INCH HOLLOW STEM AUGER | DRILLER:

☐ ____ INCH ROTARY WASH | HOURS DRILLED:

GALLONS OF WATER USED DURING DRILLING: — GALLONS

METHOD OF DECONTAMINATION PRIOR TO DRILLING: Pressurized Steam

DEVELOPMENT

METHOD OF DEVELOPMENT: Surface Pumping

DEVELOPMENT BEGAN DATE: 3/25/87 TIME: 1100

YIELD:	TIME: FROM	TO	DATE:
____ GPM			
____ GPM			
____ GPM			
____ GPM			

TOTAL WATER REMOVED DURING DEVELOPMENT: GALLONS

DESCRIPTION OF TURBIDITY AT END OF DEVELOPMENT: ☐ CLEAR ☐ SLIGHTLY CLOUDY ☒ MOD. TURBID ☐ VERY MUDDY

ODOR OF WATER: Organic

WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK ☐ STORM SEWERS ☐ STORAGE TANK ☐ DRUMS ☐ OTHER ____

DEPTH TO WATER AFTER DEVELOPMENT: 8.49' Below GS FEET

MATERIALS USED

7 SACKS OF Grout Silica SAND

3 SACKS OF Portland CEMENT

____ GALLONS OF GROUT USED

____ SACKS OF POWDERED BENTONITE

20 POUNDS OF BENTONITE PELLETS

____ FEET OF ____ INCH PVC BLANK CASING

15 FEET OF 4 INCH PVC SLOTTED SCREEN

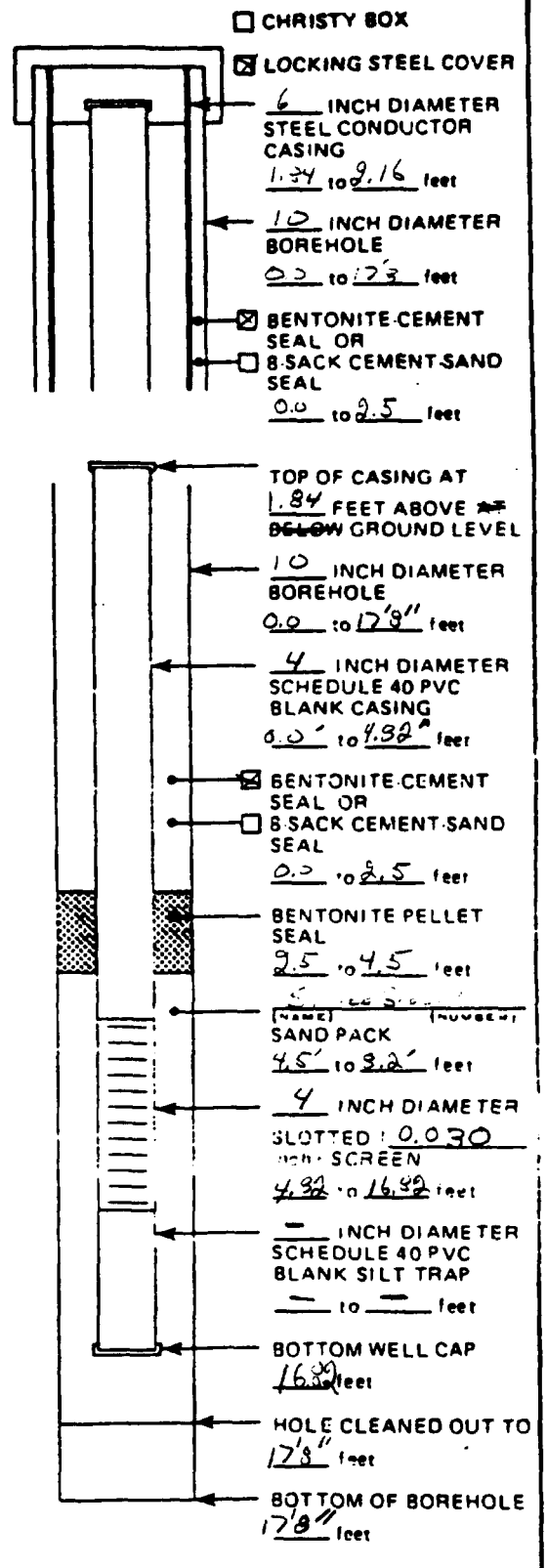
____ YARD³ CEMENT-SAND (REDI-MIX) ORDERED

____ YARD³ CEMENT-SAND (REDI-MIX) USED

CONCRETE PUMPER USED? ☒ NO ☐ YES

NAME ____

WELL COVER USED: ☒ LOCKING STEEL COVER ☐ CHRISTY BOX ☐ OTHER ____



NOT TO SCALE

ADDITIONAL INFORMATION: ____

NUS CORPORATION

2 8 0546

FIELD WELL COMPLETION FORM

JOB NAME: Saad Waste Oil

JOB NUMBER: | PROJECT MANAGER: Karmazinski

LOGGED BY: McWally | EDITED BY: Karmazinski

WELL NAME: MW-14 | DATE: 3/26/87

DRILLING COMPANY: GeoTek

EQUIPMENT: ☒ 6¼ INCH HOLLOW STEM AUGER | DRILLER:

☐ ____ INCH ROTARY WASH | HOURS DRILLED:

GALLONS OF WATER USED DURING DRILLING: — GALLONS —

METHOD OF DECONTAMINATION PRIOR TO DRILLING: Pressurized Steam

DEVELOPMENT

METHOD OF DEVELOPMENT: Surface Pumping

DEVELOPMENT BEGAN DATE: 3/26/87 TIME: 1560

YIELD:	TIME: FROM	TO	DATE:
____ GPM			
____ GPM			
____ GPM			
____ GPM			

TOTAL WATER REMOVED DURING DEVELOPMENT: — GALLONS —

DESCRIPTION OF TURBIDITY AT END OF DEVELOPMENT: ☐ CLEAR ☐ SLIGHTLY CLOUDY ☒ MOD. TURBID ☐ VERY MUDDY

ODOR OF WATER: Organic

WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK ☐ STORM SEWERS ☐ STORAGE TANK ☐ DRUMS ☐ OTHER ____

DEPTH TO WATER AFTER DEVELOPMENT: 2.31' Below GS FEET

MATERIALS USED

5 SACKS OF Grout, Silica SAND

2 SACKS OF Silica CEMENT

____ GALLONS OF GROUT USED

— SACKS OF POWDERED BENTONITE

20 POUNDS OF BENTONITE PELLETS

22? FEET OF ____ INCH PVC BLANK CASING

19 FEET OF 4 INCH PVC SLOTTED SCREEN

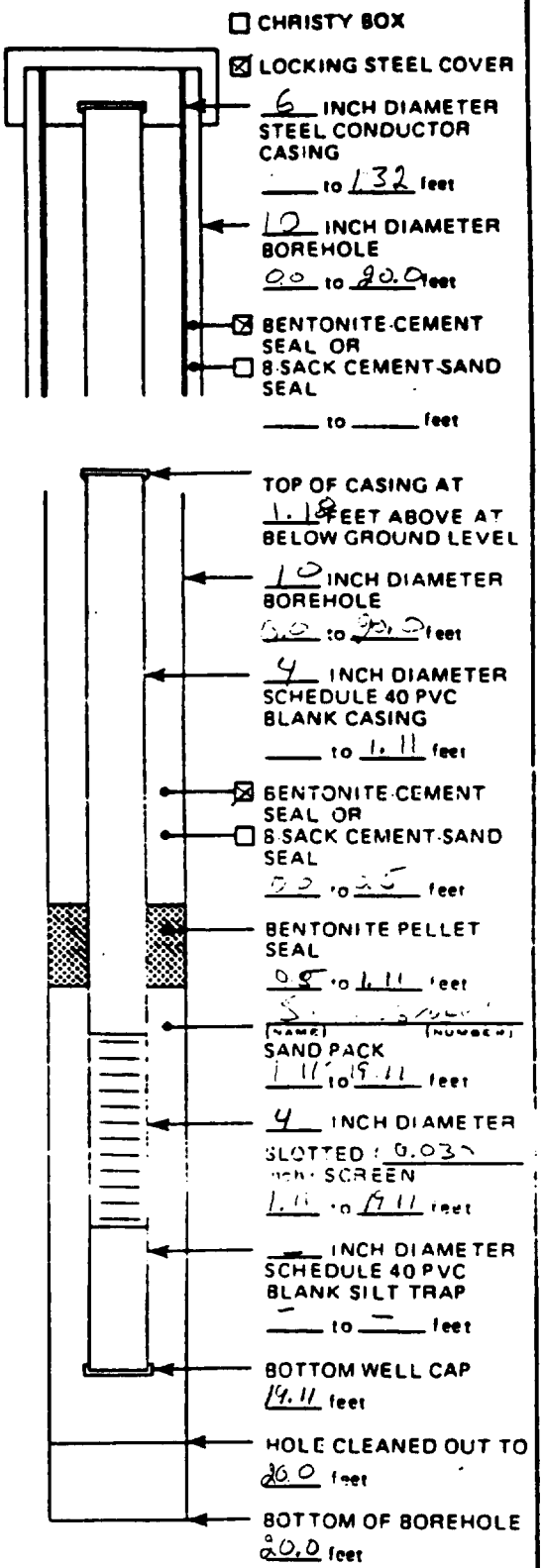
____ YARD³ CEMENT-SAND (REDI-MIX) ORDERED

____ YARD³ CEMENT-SAND (REDI-MIX) USED

CONCRETE PUMPER USED? ☒ NO ☐ YES

NAME ____

WELL COVER USED: ☒ LOCKING STEEL COVER ☐ CHRISTY BOX ☐ OTHER ____



NOT TO SCALE

ADDITIONAL INFORMATION: ____

NUS CORPORATION

2 8 0547

FIELD WELL COMPLETION FORM

JOB NAME: Saad Waste O, I

JOB NUMBER: | PROJECT MANAGER: Karmazinski

LOGGED BY: McNelly | EDITED BY: Karmazinski

WELL NAME: MW-18 | DATE: 3/24/87

DRILLING COMPANY: GeoTek

EQUIPMENT: ☒ 6¼ INCH HOLLOW STEM AUGER ☐ ____ INCH ROTARY WASH | DRILLER: | HOURS DRILLED:

GALLONS OF WATER USED DURING DRILLING: — GALLONS

METHOD OF DECONTAMINATION PRIOR TO DRILLING: Pressurized Steam

DEVELOPMENT

METHOD OF DEVELOPMENT: Surface Pumping

DEVELOPMENT BEGAN DATE: 3/24/87 TIME: 1400

YIELD:	TIME: FROM	TO	DATE:
____ GPM			
____ GPM			
____ GPM			
____ GPM			

TOTAL WATER REMOVED DURING DEVELOPMENT: GALLONS

DESCRIPTION OF TURBIDITY AT END OF DEVELOPMENT: ☐ CLEAR ☐ SLIGHTLY CLOUDY ☒ MOD. TURBID ☐ VERY MUDDY

ODOR OF WATER: Organic

WATER DISCHARGED TO: ☒ GROUND SURFACE ☐ TANK TRUCK ☐ STORM SEWERS ☐ STORAGE TANK ☐ DRUMS ☐ OTHER ____

DEPTH TO WATER AFTER DEVELOPMENT: 8.03' Below GS FEET

MATERIALS USED

4 SACKS OF Gravel, Silica SAND

2 SACKS OF Portland CEMENT

____ GALLONS OF GROUT USED

____ SACKS OF POWDERED BENTONITE

20 POUNDS OF BENTONITE PELLETS

4.73 FEET OF 2" INCH PVC BLANK CASING

5 FEET OF 2" INCH PVC SLOTTED SCREEN

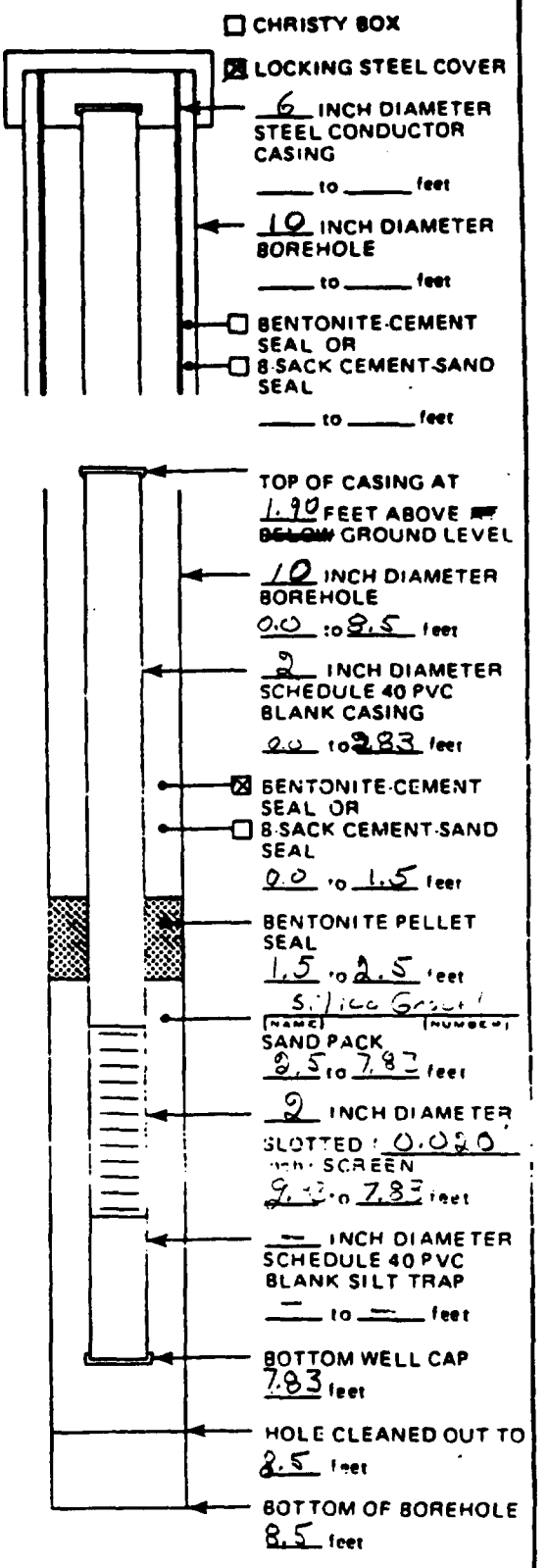
____ YARD³ CEMENT-SAND (REDI-MIX) ORDERED

____ YARD³ CEMENT-SAND (REDI-MIX) USED

CONCRETE PUMPER USED? ☒ NO ☐ YES

NAME ____

WELL COVER USED: ☒ LOCKING STEEL COVER ☐ CHRISTY BOX ☐ OTHER ____



NOT TO SCALE

ADDITIONAL INFORMATION: ____

APPENDIX E

SINGLE WELL PUMPING TEST

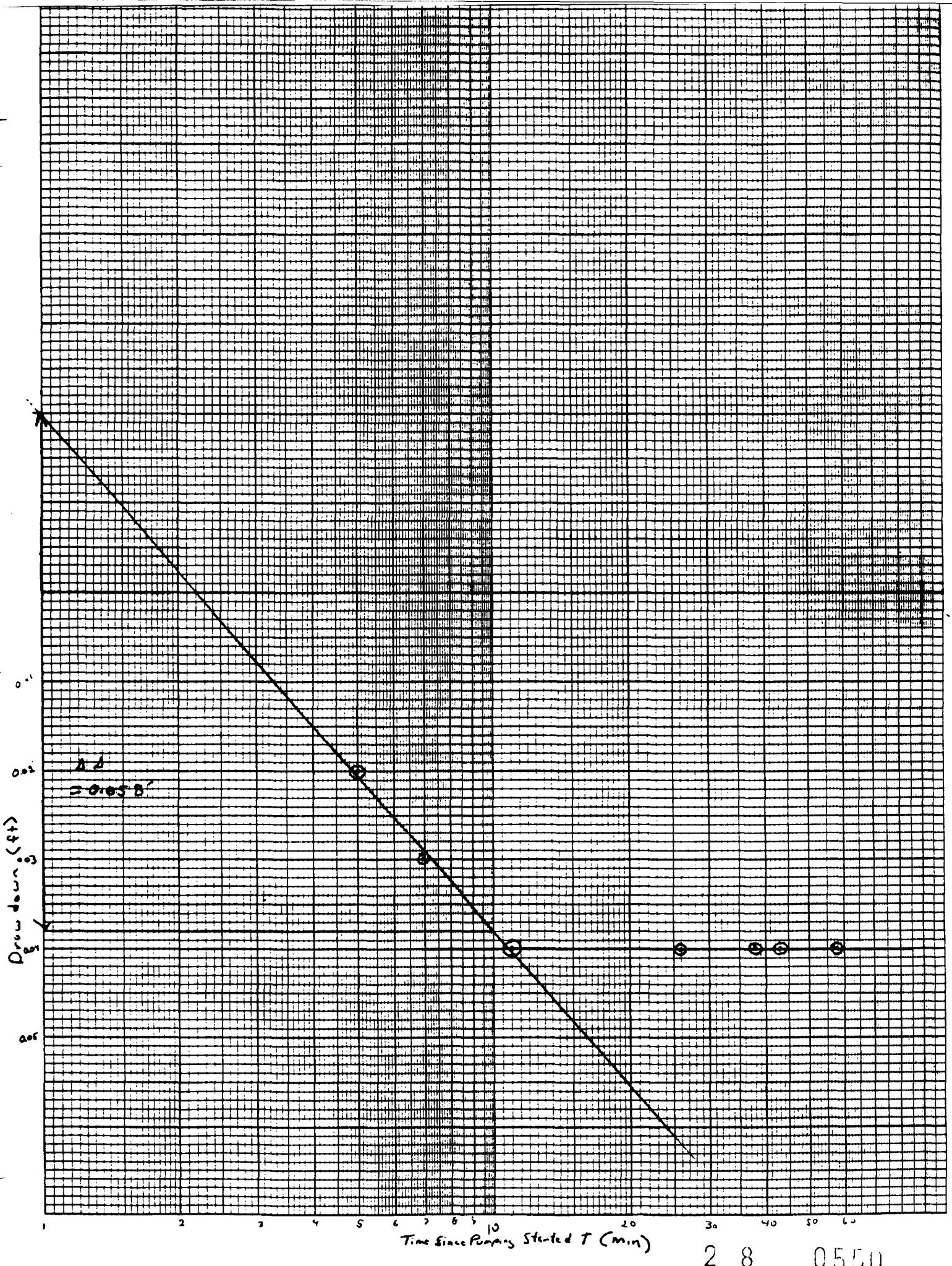
Single Well Pumping Test - B-6

2 8 0549

Ave Q 6.25GPM

Actual Time	∇ (ft)* or Pumping Rate	Time + Since Pumping Started (min)	Drawdown (ft)
~~Static~~	7.38'		
9:14 Test Begins		0	
9:16	6.56PM	2	
9:19	7.40'	5	0.02
9:21	7.41'	7	0.03
9.24	6.0GPM	10	
9:26	7.43'	12	0.05
9:33	6GPM	19	
9:40	7.43'	26	0.05
9:46	6.56PM	32	
9:52	7.43'	38	0.05
9:57	7.43'	43	0.05
10:02	6.25GPM	48	
10:12	7.43'	58	0.05
10:13	Pump off	59	

* Measured from top of temporary PVC hose installed in PVC Screen


0.1
0.02
0.03
0.05
Δd
= 0.05 B'
Drawdown (ft)
1
2
3
4
5
6
7
8
9
10
20
30
40
50
60
Time Since Pumping Started T (min)

B-6 Single well Pumping Test

$$T = \frac{264\,Q}{\Delta\Delta}$$

Where

T = Transmissivity
Q = Pumping Rate
$\Delta\Delta$ = Drawdown per log Cycle

$$= \frac{264\ (6.25\ GPM)}{0.058'}$$

$$= 28,448\ GPD/ft$$

$$K = \frac{T}{h}$$

Where:

K = Hydraulic Conductivity
T = Transmissivity
h = Saturated Thickness of Aquifer

$$K = \frac{28,448}{16'}$$

$$= 1,778\ ft/day$$

$$= 6.272 \times 10^{-1}\ cm/sec$$

Specific Capacity = $\frac{Q}{\text{drawdown}}$

= $\frac{6.25 \text{ (GPM)}}{0.05 \text{ ft}}$

= 125 GPM/ft. dd

80,400

APPENDIX F

PRIOR GROUNDWATER ANALYSIS

NUS FIT Report, Sampling Investigation Report
Saad Site, Nashville, Tennessee, September 9, 1983

Table I
Saad Site
Nashville, Tennessee

SAMPLE CODES, DESCRIPTIONS AND LOCATIONS

CODE	DESCRIPTION	LOCATION
	PHASE I:	
SS-PW-1W	Water	Newman's Private Well
SS-PW-2W	Water	Lankford's Private Well
SS-FB-W	Water	Behind Franklin Brick
SS-LN-DL-W	Water	Secondary Drainage Lagoon Radnor Railroad Yard
SS-LN-DL-S	Sediment	Secondary Drainage Lagoon Radnor Railroad Yard
SS-LN-OS-W-	Water	Oil Separator Radnor Railroad Yard
SS-LN-OS-S	Sediment	Oil Separator Radnor Railroad Yard
SS-CON-1S	Soil	18" below surface behind Saad Oil Company
SS-CON-2S	Soil	6' below surface behind Saad Oil Company
SS-S-6.1-W	Water	Ground seepage near big spring on Croft farm
SS-S-6.1-S	Sediment	Ground seepage near big spring on Croft farm
SS-S-2-W	Water	Side spring near spring S-2 on Croft farm
SS-S-2-S	Sediment	Side spring near spring S-2 on Croft farm
SS-S-3.1-W	Water	Second spring on Croft farm
SS-S-3.1-S	Sediment	Second spring on Croft farm
SS-SP4-5-W	Water	Side stream near spring on Croft farm
SS-SS-SP4-5S	Sediment	Side stream near spring on Croft farm

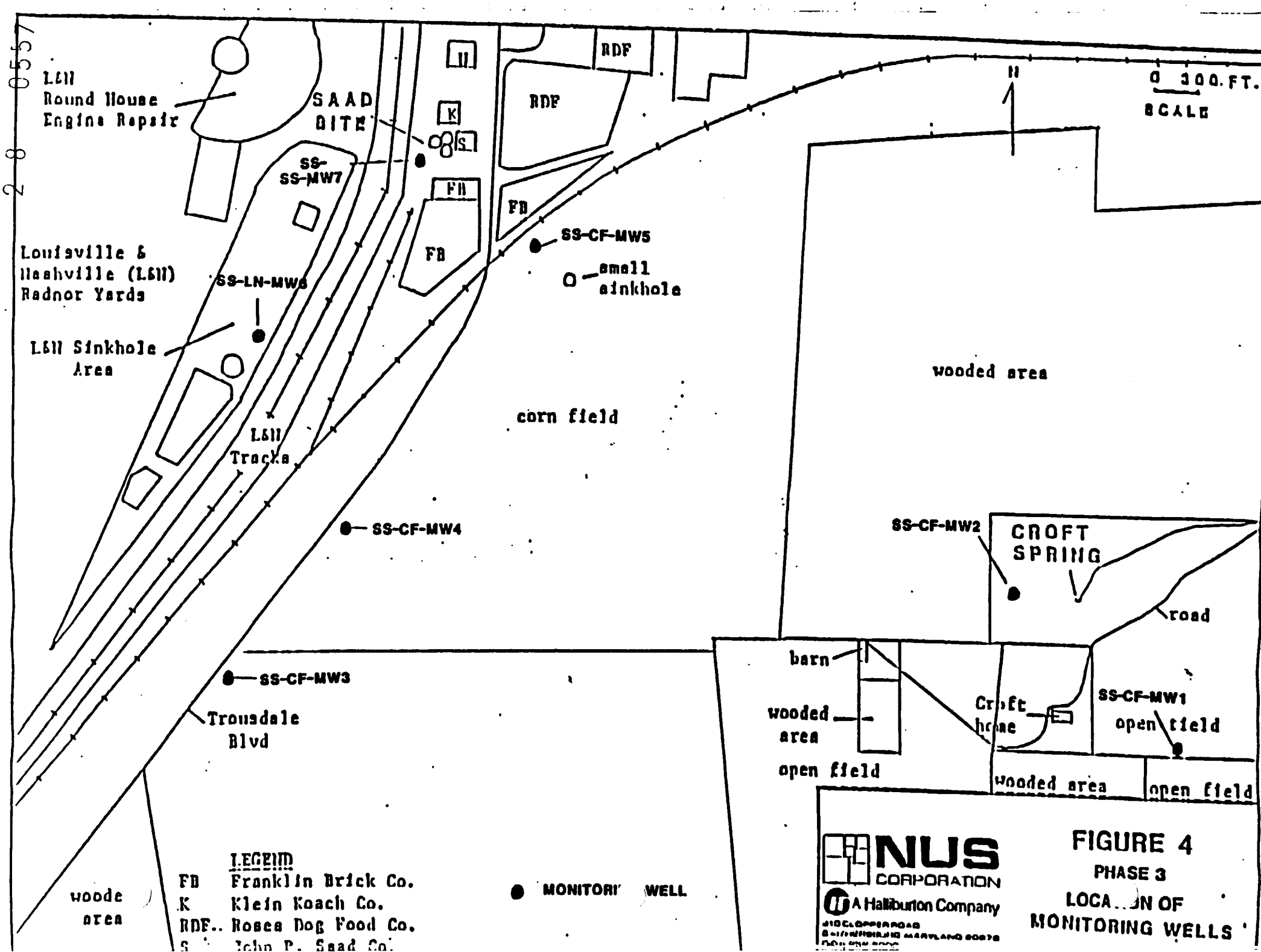
TABLE 1 (continued)

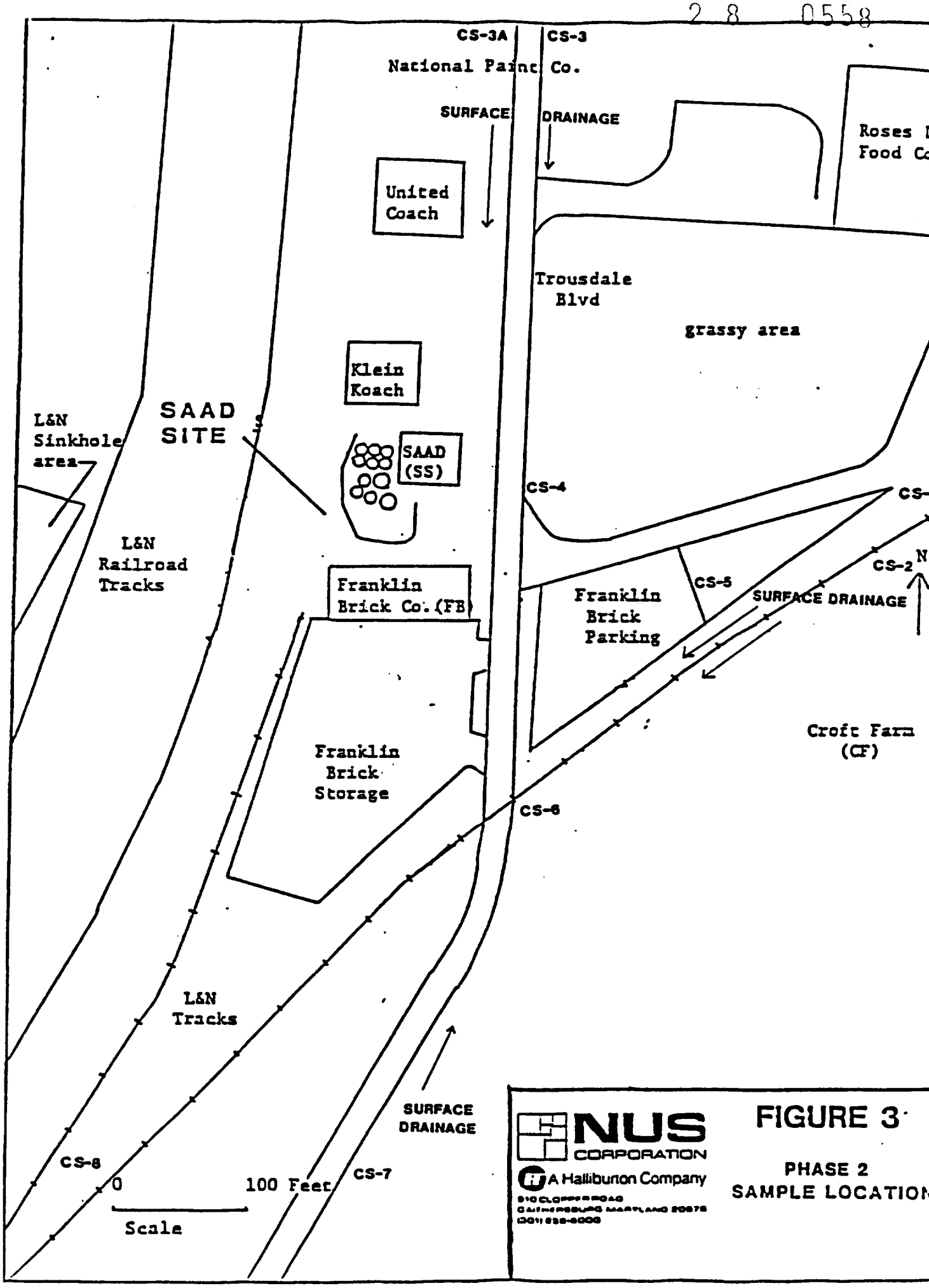
CODE	DESCRIPTION	LOCATION
SS-T-2-W	Water	Industrial creek north of Croft farm*
SS-T-2-S	Sediment	Industrial creek north of Croft farm*
SS-BC-W	Water	Below confluence of Croft spring and industrial creek*
SS-BC-S	Sediment	Below confluence of Croft spring and industrial creek*
SS-S-7-W	Water	Major spring on Croft farm (Croft spring)
SS-S-7-S	Sediment	Major spring on Croft farm (Croft spring)
SS-CF-SP*	Water	Major spring on Croft farm (Croft spring)
	PHASE II:	
SS-CS-1	Composite Soil	Intersection of Vulcan & McNalley Drive, north of railroad track
SS-CS-2	Composite Soil	Intersection of Vulcan & McNalley Drive, south of railroad track
SS-CS-3	Composite Soil	Low point east of Trousdale Blvd. at SW corner of Kabinart Corporation
SS-CS-3A	Composite Soil	Drainage ditch west of Trousdale Blvd. across from SS-CS-3
SS-CS-4	Composite Soil	Sink hole across Trousdale Blvd. from Saad site
SS-CS-5S	Sediment	Low point behind fenced area across from Saad Oil Company
SS-CS-5W	Water	Low point behind fenced area across from Saad Oil Company

TABLE I (continued)

CODE	DESCRIPTION	LOCATION
SS-CS-6	Composite Soil	Drainage ditch on Croft Farm at corner of railroad track Trousdale Road
SS-CS-7	Composite Soil	Drainage ditch on eastern side of Trousdale Road at culvert mouth
SS-CS-8W	Water	Ditch west of Trousdale Road south of Saad site
SS-CS-8S	Sediment	Ditch west of Trousdale Road south of Saad site
	PHASE III (Figure 4)	
SS-WT-1	Water	Tank truck used by driller
SS-CF-MW2	Water	Monitoring well No. 2 on Croft Farm
SS-CF-MW3	Water	Monitoring well No. 3 on Croft Farm
SS-CF-MW4	Water	Monitoring well No. 4 on Croft Farm
SS-CF-MW5	Water	Monitoring well No. 5 on Croft Farm
SS-LN-MW6	Water	Monitoring well on L&N property
SS-SS-MW7	Water	Monitoring well on Saad property

* Sample actually taken during Phase III but is included with the other samples collected from the spring in Phase I.


L&N
Round House
Engine Repair
SAAD
SITE
SS-
SS-MW7
RDF
RDF
K
S
FB
FB
FB
SS-CF-MW5
small
sinkhole
Louisville &
Nashville (L&N)
Radnor Yards
SS-LN-MW8
L&N Sinkhole
Area
L&N
Tracks
wooded area
corn field
SS-CF-MW4
SS-CF-MW2
CROFT
SPRING
road
barn
wooded
area
open field
Croft
home
SS-CF-MW1
open field
wooded area
open field
SS-CF-MW3
Trousdale
Blvd
woode
area
N
0 300 FT.
SCALE
LEGEND
FB Franklin Brick Co.
K Klein Koach Co.
RDF.. Rosea Dog Food Co.
S John P. Saad Co.
MONITORI WELL
NUS
CORPORATION
A Halliburton Company
FIGURE 4
PHASE 3
LOCA..ON OF
MONITORING WELLS



NUS CORPORATION
A Halliburton Company
910 CLOPPER ROAD
GAITHERSBURG MARYLAND 20878
(301) 258-8000

FIGURE 3

PHASE 2
SAMPLE LOCATION

Table II
Saad Site - Phase I
Water Samples
Inorganic Analysis
(in ug/l)

Element	SS-PW-1W	SS-PW-2W	SS-FB-W	SS-LN-DL/W	SS-LN-OS/W	SS-CF-SP	SS-S-7/W	SS-S-6.1/W	SS-S-2/W	SS-S-3.1/W	SS-SP4-5/W	SS-T-2/W	SS-BC/W
Barium	-	-	380	21	-	-	-	121	14	-	-	-	-
Cadmium*	-	-	-	-	-	3	-	-	-	-	-	-	-
Copper*	5	17	22	38	-	-	-	-	-	-	-	-	-
Lead*				-	-	22	-	-	-	-	-	-	-
Strontium	341	144	530	113	278	-	160	104	140	85	91	171	163
Titanium	3	10	230	13	-	-	-	278	21	-	10	-	10
Vanadium	-	-	33	-	-	-	-	13	-	-	-	-	-
Yttrium	-	-	17	-	-	-	-	11	-	-	-	-	-
Zinc*	22	267	95	78	-	-	-	30	-	-	-	-	10
Aluminum	130	400	39,000	500	100	-	100	11,000	580	-	500	200	200
Manganese	10	46	1,400	77	2,200	3,200	2,400	1,400	920	-	-	72	170
Calcium	54,000	70,000	250,000	36,000	96,000	-	90,000	102,000	84,000	61,000	72,000	99,000	92000
Magnesium	10,000	6,600	26,000	5,400	9,700	-	6,500	6,600	6,200	4,900	5,000	6,600	6200
Iron	900	300	22,000	900	700	5,300	26,000	12,000	1,000	-	200	100	200
Sodium	4,500	9,000	19,000	12,000	31,000	-	11,000	12,000	9,000	4,000	10,000	10,000	9000
Cyanide*	<2	<2	20	<2	10	-	<2	<2	<2	<2	<2	<2	<2

- Material was analyzed for but not detected

Table III
Saad Site - Phase I
Water Samples
Purgeable Organic Analysis
(in ug/l)

Compound	SS-PW-1W	SS-PW-2W	SS-FB-W(2)	SS-LN-D[illegible]/W	SS-LN-OS/W	SS-CF-SP	SS-S-7/W	SS-S-6.1/W(3)	SS-S-2/W	SS-S-3.1/W	SS-SP4/5/W(1)	SS-T-2/W	SS-BC/W
Chloroethane*	-	-	5.3	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane*	-	-	5.1	-	16	-	2 J	22	-	-	-	2 J	2 J
Trans-1,2-Dichloroethene	64	-	8.5	-	-	-	-	3 J	-	-	-	0.9 J	-
Chloroform*	-	-	-	20	3 J		0.5 J	-	-	0.8 J	0.5 J	0.6 J	0.5 J
1,1,1-Trichloroethane*	-	-	-	-	5[illegible]	-	-	3 J	-	-	-	5 J	3 J
Bromodichloromethane	-	-	-	0.8 J	-		-	-		-	-	-	-
Trichloroethene	-	-	0.5 J	-	-		-	0.6 J	-	-	-	1 J	0.7 J
Benzene*	-	-	4 J	-	-	-	-	-	-	-	NA	-	-
Tetrachloroethene	-	0.6 J	-	-	-	-	-	-	-	-	0.9 J	12	9
Toluene*	-	-	230 J	-	-	-	-	-	-	-	NA	-	-
Chlorobenzene*	-	-	-	-	-	-	2 J	-	-	-	NA	-	-
Ethyl Benzene*	-	-	9.2 J	-	-	-	-	-	-	-	NA	-	-
M-Xylene	-	-	32 J	-	-	NA	-	-	-	-	NA	-	-
OxP-Xylene(mixed)	-	-	40 J	-	-	NA	-	-	-	-	NA	-	-
2-methyl-2-methylpropane	-	5 JN	-	-	-	-	-	-	-	-	-	-	-

Table III (continued)
Saad Site - Phase I
Water Samples
Purgeable Organic Analysis
(in ug/l)

Compound	SS-PW-1W	SS-PW-2W	SS-FB-W(2)	SS-LN-DL/W	SS-LN-OS/W	SS-CF-SP	SS-S-7/W	SS-S-6.1/W(3)	SS-S-2/W	SS-S-3.1/W	SS-SP4/5/W(1)	SS-T-2/W	SS-BC/W
total unidentified alkylhydrocarbons	-	-	20 J	-	-	-	-	-	-	-	-	-	-
methyl isobutyl ketone	-	-	30 JN	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride*	-	-	4 J	-	-	-	-	-	-	-	-	-	-

(1) For station SP4-5/W, acid preserved sample was lost dunig analysis.
(2) No acid preserved sample.
(3) Holding time exceeded.
J Estimated value.
N Presumptive evidence of presence of material.
NA compound not analyzed for.
* Priority pollutant.

Table IV
Saad Site - Phase I
Water Samples
Extractable Organic Analysis
(in ug/l)

Compound	PW-1W	PW-2W	FB-W	LN-DL/W	LN-OS/W	CF-SP(1)	S-7/W	S-6.1/W	S-2/W	S-3.1/W	SP4/5/W	T-2/W	BC/W
Acenaphthene*	-	-	1.0J	-	-	-	-	-	-	-	-	-	-
Flouranthene*	-	-	1.0J	-	-	-	-	-	-	-	-	-	-
Pyrene*	-	-	1.0J	-	-	-	-	-	-	-	-	-	-
Chyrsene*	-	-	-	5 J	-	-	-	-	-	-	-	-	-
Benzo(6HI)Perylene*	-	-	-	14 J	-	-	-	-	1.0 J	-	-	-	-
2,4-Dimethylphenol*	-	-	3.8 J	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol*	-	-	-	84 J	-	-	-	-	1.0 J	-	-	-	-
Naphthaleneamine (3 isomers)	-	-	25 JN	-	-	-	-	-	-	-	-	-	-
C_3Alkylbenzenesulfo-Namide	-	-	10 JN	-	-	-	-	-	1.0 J	-	-	-	-
Phosphoric acid, tributyl ether	-	-	10 JN	-	-	-	-	-	-	-	-	-	-
C_5Alkylbenzenesulfo-namide	-	-	10 JN	-	-	-	-	-	1.0 J	-	-	-	-
Hexadecanoic Acid	-	-	10 JN	-	-	-	10 JN	-	-	10 JN	-	-	-
Methylphenal	-	-	10 JN	-	-	-	-	-	1.0 J	-	-	-	-

Table IV (continued)
Saad Site - Phase I
Water Samples
Extractable Organic Analysis
(in ug/l)

Compound	PW-1W	PW-2W	FB-W	LN-DL/W	LN-OS/W	CF-SP(1)	S-7/W	S-6.1/W	S-2/W	S-3.1/W	SP4/5/W	T-2/W	BC/W
Methyldibenzothiophene	-	-	-	-	20 JN	-	-	-	-	-	-	-	-
Methylphenanthrene	-	-	-	-	10 JN	-	-	-	-	-	-	-	-
C_2alkylphenanthrene (4 isomers)	-	-	-	-	40 JN	-	-	-	-	-	-	-	-
C_2Alkylphenanthrene (4 isomers)	-	-	-	-	10 JN	-	-	-	-	-	-	-	-
Methylpyrene	-	-	-	-	10 JN	-	-	-	-	-	-	-	-
Bromoethylmethylpropyl-	-	-	-	-	-	-	10 JN	-	-	-	-	-	-
Dimethylbenzenesulfonamide	-	-	-	-	-	-	-	-	10 JN	-	-	-	-
Petroleum Type Product	-	-	-	-	NQ	-	-	-	-	-	-	-	-
Unidentified Compounds(2)	-	-	2	-	-	-	-	-	-	1	1	-	-

- Material was analyzed for but not detected.
J Estimated value.
N Presumptive evidence of resence of material.
NQ Material not quantified.
(2) For station CF-SP, quantity for phenals is suspect based on QC data.
(2) Recorded in number of compounds detected not ug/l.
* Prioity pollutant.

Table IV (continued)
Saad Site - Phase I
Water Samples
Extractable Organic Analysis
(in ug/l)

Compound	PW-1W	PW-2W	FB-W	LN-DL/W	LN-OS/W	CF-SP(1)	S-7/W	S-6.1/W	S-2/W	S-3.1/W	SP4/5/W	T-2/W	BC/W
C_3Alkylnaphthalene (2 isomers)	-	-	-	50 JN	-	-	-	-	-	-	-	-	-
Dibenzothiophene	-	-	-	50 JN	-	-	-	-	-	-	-	-	-
Methyldibenzothiophene (2 isomers)	-	-	-	50 JN	-	-	-	-	-	-	-	-	-
C_2Alkylnaphthothiophene (2 isomers)	-	-	-	50 JN	-	-	-	-	-	-	-	-	-
C_2Alkylphenanthrene	-	-	-	50 JN	-	-	-	-	1.0 J	-	-	-	-
Tetrahydromethylnaphthalene (2 isomers)	-	-	-	-	15 JN	-	-	-	-	-	-	-	-
C_2Alkylnaphthalene (2 isomers)	-	-	-	-	10 JN	-	-	-	1.0 J	-	-	-	-
Octahydrohexamethyl-Iindene	-	-	-	-	21 JN	-	-	-	-	-	-	-	-
C_3Alkylnaphthalene (7 isomers)	-	-	-	-	50 JN	-	-	-	1.0 J	-	-	-	-
C_4Alkylnaphthalene (5 isomers)	-	-	-	-	150 JN	-	-	-	-	-	-	-	-
C_2Alkylbiphenyl	-	-	-	-	10 JN	-	-	-	1.0 J	-	-	-	-

Table V
Saad Site - Phase I
Soil/Sediment Samples
Inorganic Analysis
(in ug/kg)(1)

Element	SS-LN-D4S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-2/S	SS-S-3.1/S	SS-SP4-5/S	SS-T-2/S	SS-BC/S	SS-CF-SP
Silver*	-	-	8,400	-	-	-	-	-	-	-	-	1,700
Arsenic*	-	-	-	-	-	-	-	-	-	-	-	1,500
Barium	56,000	100,000	250,000	240,000	250,000	220,000	330,000	190,000	90,000	130,000	130,000	35,000
Cadmium*	1,000	-	31,000	-	-	-	-	-	-	-	-	1,000
Cobalt	-	-	-	-	-	-	NA	NA	-	NA	NA	5,500
Chromium*	10,000	25,000	180,000	34,000	30,000	20,000	26,000	18,000	15,000	11,000	15,000	8,800
Copper*	24,000	69,000	170,000	26,000	17,000	7,600	5,000	6,000	4,400	5,000	13,000	-
Nickel*	4,600	10,000	96,000	20,000	-	12,000	12,000	9,000	8,000	7,000	6,500	8,900
Lead*	26,000	82,000	410,000	100,000	-	21,000	16,000	15,000	9,000	46,000	140,000	2,200
Tin	-	-	40,000J	-	-	-	-	-	-	-	-	-

Table V (continued)
Saad Site - Phase I
Soil/Sediment Samples
Inorganic Analysis
(in ug/kg)(1)

Element	SS-LN-D4S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-2/S	SS-S-3.1/S	SS-SP4-5/S	SS-T-2/S	SS-BC/S	SS-CF-SP
Strontium	62,000	290,000	140,000	230,000	370,000	150,000	280,000	310,000	100,000	-	330,000	NA
Tellurium	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	64,000	140,000	74,000	120,000	180,000	390,000	360,000	130,000	140,000	-	120,000	NA
Zinc*	70,000	69,000	860,000	150,000	31,000	42,000	30,000	59,000	22,000	22,000	58,000	12,000
Mercury*	NAI	-	NA	NA	190	120	220	220	250	-	-	-
Thallium*	-	-	-	-	-	-	-	-	-	110,000	-	-
Alumium	3,500,000	9,400,000	9,800,000	19,000,000	19,000,000	19,000,000	20,000,000	14,000,000	15,000,000	9,900,000	12,000,000	2,000,000
Manganese	170,000	840,000	680,000	1,200,000	5,500,000	640,000	5,100,000	7,200,000	780,000	2,000,000	1,800,000	5,600,000

Table V (continued)
Saad Site - Phase I
Soil/Sediment Samples
Inorganic Analysis
(in ug/kg)(1)

Element	SS-LN-D4S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-2/S	SS-S-3.1/S	SS-SP4-5/S	SS-T-2/S	SS-BC/S	SS-CF-SP
Iron	8,400,000	22,000,000	18,000,000	25,000,000	83,000,000	18,000,000	32,000,000	18,000,000	14,000,000	17,000,000	2,200,000	10,000,000
Sodium	230,000	550,000	680,000	450,000	1,100,000	300,000	490,000	880,000	370,000	490,000	590,000	NA
Cyanide*	200	200	-	-	200	200	200	200	200	200	200	-

- Material was analyzed for but not detected.
NA Element not analyzed for.
J Estimated value.
NAI Interferences
* Priority
Actual value is known to be less than value given.
(1) Dry Weight

Table VI
Saad Site - Phase I
Soil/Sediment Samples
Purgeable Organic Analysis
(in ug/kg)(3)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-2/S	SS-S-3.1/S	SS-SP4-5S	SS-T-2/S	SS-BC/S	SS-CF-SP
1,1-Dichloroethane*	290	3J	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane*	450	4J	3,000J	-	-	-	-	-	-	-	-	-
Trichloroethene	4J	-	65,000	2,000J	-	-	-	-	-	-	-	-
Tetrachloroethene	-	-	14,000	-	-	-	-	-	3J	3J	4J	-
Toluene*	78	-	270,000	16,000	-	-	-	-	-	-	-	-
Ethyl Benzene*	130	-	-	-	-	-	-	-	-	-	-	-
M-Xylene	310	-	170,000	4,000J	-	-	-	-	-	-	-	NA
O & P-Xylene (mixed)	260	-	120,000	4,000J	-	-	-	-	-	-	-	-

Table VI (continued)
Saad Site - Phase I
Soil/Sediment Samples
Purgeable Organic Analysis
(in ug/kg)(3)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-2/S	SS-S-3.1/S	SS-SP4-5S	SS-T-2/S	SS-BC/S	SS-CF-SP
Isopropanol	10JN	-	-	-	-	-	-	-	-	-	-	-
Methylethyl Ketone	500JN	-	-	-	-	-	-	-	-	-	-	-
Methyl Isopropyl Ketone	30JN	-	-	-	-	-	-	-	-	-	-	-
Methyl Butyl Ketone	30JN	-	-	-	-	-	-	-	-	-	-	-
Methyl Isobutyl Ketone	300JN	-	-	-	-	-	-	-	-	-	-	-
Total Unidentified Alkyl Hydrocarbons	6,800J	1,000J	1,700,000J	180,000J	1,100J	-	-	-	-	-	-	-
Unidentified Terpene	-	30J	-	-	50J	-	-	-	-	-	-	-
Tricyclodecane	-	-	-	-	-	-	-	-	-	-	-	-

Table VI (continued)
Saad Site - Phase I
Soil/Sediment Samples
Purgeable Organic Analysis
(in ug/kg)(3)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-2/S	SS-S-3.1/S	SS-SP4-5S	SS-T-2/S	SS-BC/S	SS-CF-SP
Trimethylcyclohexane	-	-	-	-	-	-	-	-	-	-	-	-
Unidentified Compounds	-	-	-	-	-	-	-	-	-	-	-	-
Methylene Chloride	-	-	250,000	-	-	-	-	-	-	-	-	-
Trans-1,2-Dichloroethene	-	-	13,000	12,000	-	-	-	-	-	-	-	-
Isooctanol	-	-	180,000JN	18,000JN	-	-	-	-	-	-	-	-
C_9Alcohol (isomer unknown)	-	-	37,000J	14,000J	-	-	-	-	-	-	-	-

Table VI (continued)
Saad Site - Phase I
Soil/Sediment Samples
Purgeable Organic Analysis
(in ug/kg)(3)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-2/S	SS-S-3.1/S	SS-SP4-5S	SS-T-2/S	SS-BC/S	SS-CF-SP
Decanol	-	-	220,000JN	22,000JN	-	-	-	-	-	-	-	-

* Priority pollutants.
\- Material was analyzed for but not detected.
J Estimated value.
N Presumptive evidence of presence of material
NA Compound not analyzed for.
(1) Unidentified compounds recorded as number of compounds detected, ug/kg.
(2) The data is suspect based on quality control information.
(3) Dry weight.

Table VII
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS-LN-DL/S	SS-LN-06/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-3.1/S	SS-SP4/5S	SS-T-2/S	SS-BC/S	SS-CF-SP
Naphthalene*	5,400J	2,000J	-	-	-	-	-	-	-	-	-
Acenaphthene*	4,600J	-	-	-	-	-	-	-	1,400J	-	-
Flourene*	12,000J	4,500J	-	-	-	-	-	-	1,400J	-	-
Phenanthrene*	36,000J	18,000J	-	-	-	-	-	-	2,500J	-	-
Anthracene	-	2,000J	-	-	-	-	-	-	1,400J	-	-
Flouranthene*	4,600J	3,400J	-	-	-	-	-	-	1,300J	-	-
Pyrene*	7,500J	9,000J	-	-	-	-	-	-	3,900J	-	-
Benzo(A)Anthracene*	-	2,000J	-	-	-	-	-	-	1,400J	-	-

Table VII (continued)
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-3.1/S	SS-SP4/5S	SS-T-2/S	SS-BC/S	SS-CF-SP
Chrysene*	4,600J	2,000J	-	-	-	-	-	-	1,400J	-	-
Benzo(B)Flouranthene	-	2,000J	-	-	-	-	-	-	1,400J	-	-
Benzo(K)Flouranthene*	-	2,000J	-	-	-	-	-	-	1,400J	-	-
Benzo-A-Pyrene*	-	-	-	-	-	-	-	-	1,400J	-	-
Benzo(GHI)Perylene*	-	-	-	-	-	-	-	-	2,500J	-	-
Pentachlorophenol*	-	-	-	-	-	2,700J	520J	-	-	-	-
C_2Alkylstyrene	46,000JN	-	-	-	-	-	-	-	-	-	-
C_3Alkylstyrene (3 isomers)	46,000JN	-	-	-	-	-	-	-	-	-	-

Table VII (continued)
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS-LN-DL/S	SS-LN-OL/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-3.1/S	SS-SP4/5S	SS-T-2/S	SS-BC/S	SS-CF-SP
Methylnaphthalene (2 isomers)	50,000JN	-	-	-	-	-	-	-	-	-	-
C_2Alkylnaphthalene (5 isomers)	110,000JN	-	-	-	-	-	-	-	-	-	-
C_3Alkylnaphthalene (7 isomers)	120,000JN	70,000JN	-	-	-	-	-	-	-	-	-
C_4Alkylnaphthalene (4 isomers)	80,000JN	-	-	-	-	-	-	-	-	-	-
Dimethyltetrahydronaphthalene (2 isomers)	46,000JN	-	-	-	-	-	-	-	-	-	-
Methylbiphenyl (2 isomers)	46,000JN	-	-	-	-	-	-	-	-	-	-

Table VII (continued)
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-3.1/S	SS-SP4/5S	SS-T-2/S	SS-BC/S	SS-CF-SP
C_2Alkylflourene (4 isomers)	50,000JN	-	-	-	-	-	-	-	-	-	-
Dibenzothiophene	60,000JN	-	-	-	-	-	-	-	-	-	-
Methylphenanthrene (3 isomers)	70,000JN	-	-	-	-	-	-	-	-	-	-
C_2alkylphenanthrene (5 isomers)	50,000JN	26,000JN	-	-	-	-	-	-	-	-	-
C_3Alkyphenanthrene	46,000JN	-	-	-	-	-	-	-	-	-	-
Dimethylnaphthothiophene	50,000JN	-	-	-	59,000JN	-	-	-	-	-	-
C_4Alkylbenzene	-	20,000JN	-	-	-	-	-	-	-	-	-

Table VII (continued)
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-3.1/S	SS-SP4/5S	SS-T-2/S	SS-BC/S	SS-CF-SP
C_5Alkylbenzene (3 isomers)	-	20,000JN	-	-	-	-	-	-	-	-	-
Methyldecahydronaphthalene	-	20,000JN	-	-	-	-	-	-	-	-	-
C_3Alkylstyrene (2 isomers)	-	20,000JN	-	-	-	-	-	-	-	-	-
C_4Alkylstyrene (4 isomers)	-	26,000JN	-	-	-	-	-	-	-	-	-
Methylnaphthalene	-	20,000JN	-	-	-	-	-	-	-	-	-
C_2Alkylnaphthalene (3 isomers)	-	60,000JN	-	-	-	-	-	-	-	-	-

Table VII (continued)
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-3.1/S	SS-SP4/5S	SS-T-2/S	SS-BC/S	SS-CF-SP
C_4Alkylnaphthalene (7 isomers)	-	70,000JN	-	-	-	-	-	-	-	-	-
C_2Alkylbiphenyl (2 isomers)	-	26,000JN	-	-	-	-	-	-	-	-	-
Methyldibenzofuran	-	20,000JN	-	-	-	-	-	-	-	-	-
Methylflourene	-	26,000JN	-	-	-	-	-	-	-	-	-
C_2Alkylflourene	-	20,000JN	-	-	-	-	-	-	-	-	-
Methylphenanthrene (2 isomers)	-	20,000JN	-	-	-	-	-	-	-	-	-

Table VII (continued)
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-3.1/S	SS-SP4/5S	SS-T-2/S	SS-BC/S	SS-CF-SP
C_3Alkylphenanthrene (5 isomers)	-	26,000JN	-	-	-	-	-	-	-	-	-
Methylnaphthethiophene	-	20,000JN	-	-	-	-	-	-	-	-	-
Methylfluoranthene (2 isomers)	-	20,000JN	-	-	-	-	-	-	-	-	-
Methyl(cyclohexylmethyl) Cyclohexane	-	-	-	-	59,000JN	-	-	-	-	-	-
Hexamethyloctahydroindene	-	-	-	-	59,000JN	-	-	-	-	-	-
C_3Alkylnaphthalene	-	-	-	-	59,000JN	-	-	-	-	-	-
C_4Alkylnaphthalene (3 isomers)	-	-	-	-	59,000JN	-	-	-	-	-	-

Table VII (continued)
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS-LN-DL/S	SS-LN-OS/S	SS-CON-1S	SS-CON-2S	SS-S-7/S	SS-S-6.1/S	SS-S-3.1/S	SS-SP4/5S	SS-T-2/S	SS-BC/S	SS-CF-SP
Hexadecenoic Acid	-	-	-	-	-	6,000JN	-	-	-	-	-
Heptadecanoic Acid	-	-	-	-	-	5,000JN	-	-	-	-	-
Hexadecanoic Acid, Methyl Ester	-	-	-	-	-	5,000JN	-	-	-	-	-
Petroleum Product	NQ	NQ	NQ	NQ	NQ	NQ	-	-	NQ	NQ	N

* Priority pollutant.
- Material was analyzed for but not detected.
NA Not analyzed for.
J Estimated value.
N Presumptive evidence of presence of material.
NQ Not quantified.
(1) Dry weight.

Table VIII
Saad Site - Phase I
Soil/Sediment Samples
Pesticides/PCB's and other chlorinated compounds
(in ug/kg)(2)

Compounds	LN-DL/S	LN-OS/S	CON-1S	CON-2S	S-7/S	S-6.1/S	S-2/S	S-3.1/S	SP4-5/S	T-2/S	BC/S	CF-SP(1)
Gamma-chlordane	-	-	-	-	-	-	-	-	-	62	48	-

- Material was analyzed for but not detected.

(1) For station CF-SP, all data suspect based on QC data.

(2) Data reported on dry weight basis.

Table IX
Saad Site - Phase II
Water Samples
Inorganic Analysis
(in ug/l)

Element	SS-CS-5W	SS-CS-8W
Cadmium*	10	6
Lead*	8	10
Selenium*	9	5
Zinc*	26	32
Aluminum	760	910
Manganese	150	110
Iron	1100	1110

* Priority pollutant.

TABLE X

Saad Site - Phase II

Water Samples

Purgeable Organics Analysis

(in ug/l)

Compound	SS-CS-5W	SS-CS-8W
Acetone	NQ	--

- Material was analyzed for but not detected.
NQ - Not quantified

TABLE XI

Saad Site - Phase II

Water Samples

Extractable Organic Analysis

(in ug/l)

Compound	SS-CS-5W	SS-CS-8W
Prometon	-	NQ

- Material was analyzed for but not detected.
NQ - Not quantified

Table XII
Saad Site - Phase II
Soil/Sediment Samples
Inorganic Analysis(1)
(in ug/kg)

Element	SS-CS-1	SS-CS-2	SS-CS-3	SS-CS-3A	SS-CS-4	SS-CS-5S	SS-CS-6	SS-CS-7	SS-CS-8S
Aluminum	2,500,000	3,000,000	1,600,000	1,300,000	2,000,000	930,000	2,100,000	1,800,000	2,900,000
Manganese	280,000	230,000	220,000	160,000	240,000	260,000	130,000	240,000	230,000
Iron	1,400,000	860,000	770,000	610,000	480,000	1,200,000	420,000	500,000	1,700,000
Cyanide*	-	-	-	-	3,400	1,000	-	-	-

* Priority pollutant
\- Material was analyzed for but not detected.
(1) Data reported on a wet weight basis.

Table XII
Saad Site - Phase II
Soil/Sediment Samples
Inorganic Analysis(1)
(in ug/kg)

Element	SS-CS-1	SS-CS-2	SS-CS-3	SS-CS-3A	SS-CS-4	SS-CS-5S	SS-CS-6	SS-CS-7	SS-CS-8S
Silver *	-	-	-	2,700	-	-	-	-	-
Barium	35,000	33,000	46,000	-	48,000	120,000	22,000	30,000	25,000
Cadmium*	900	200	3,900	1,700	1,300	1,100	500	1,000	1,100
Cobalt	-	-	-	9,100	-	-	-	-	-
Chromium*	3,300	2,400	5,100	4,700	2,500	3,700	2,600	3,300	6,500
Copper*	7,200	-	10,000	7,300	9,400	24,000	-	-	9,600
Nickel*	-	-	7,500	10,000	-	6,700	-	-	5,200
Lead*	11,000	-	110,000	56,000	210,000	51,000	-	38,000	17,000
Selenium*	2,700	4,200	2,900	3,800	3,200	1,900	2,000	3,200	3,100
Zinc*	13,000	12,000	160,000	160,000	110,000	58,000	4,100	18,000	41,000

Table XIII
Saad Site - Phase II
Soil/Sediment Samples
Purgeable Organic Analysis
(in ug/kg)(1)

Compound	SS-CS-1	SS-CS-2	SS-CS-3	SS-CS-3A	SS-CS-4	SS-CS-5	SS-CS-6	SS-CS-7	SS-CS-8S
Methylene Chloride*	-	-	-	88	34	-	-	-	-
1,1,1-Trichloroethane*	-	-	-	-	1.5 J	-	-	-	-
Trichlorotriflouroethane	-	3,300 JN	-	-	-	-	3.7 JN	5.1 JN	
Trimethylpentane	-	2,500 JN	-	-	-	-	-	-	
Flourotrichloromethane	-	-	3.6	-	4.4	-	3,400	5.3	
Hexane	-	-	-	-	-	-	2.6 JN	-	
Acetone	-	-	-	-	-	-	-	-	19 J
2-hexanone	-	-	-	-	-	-	-	-	-

- Material was analyzed for but not detected.
J Estimated value.
N Presumptive evidence of presence of material.
* Priority pollutant.
(1) Data reported on wet weight basis.

Table XIV (continued)
Saad Site - Phase II
Soil/Sediment Samples
Extractable Organic Analysis
(ug/kg)(3)

Compound	SS-CS-1(1)	SS-CS-2(1)	SS-CS-3(2)	SS-CS-3A(2)	SS-CS-4	SS-CS-5S(1)	SS-CS-6(1)	SS-CS-7(1)	SS-CS-8S
Indeno(1,2,3-CD)Pyrene*	-	800 J	-	-	-	-	-	-	-
Dibenzo(A,H)Anthracene*	-	800 J	-	-	-	-	-	-	-
Benzo(6HI)Perylene*	-	800 J	-	-	-	-	-	-	-
Hydroxymethylpentanone	550 JN	-	-	400 JN	-	-	-	0.32 JN	-
Tetradecanoic Acid	-	-	-	1300 JN	-	-	-	-	-
Pentadecanoic Acid	-	-	-	600 JN	-	-	-	-	-
Hexadecanoic Acid	-	-	-	4100 JN	-	-	-	-	-
Octadecanoic Acid	-	-	-	800 JN	-	-	-	-	-
Hexane	-	-	-	-	-	1800 JN	-	-	-
Petroleum Product	-	-	-	-	-	N	-	-	-

Table XV
Saad Site - Phase III
Water Samples
Inorganic Analysis
(in ug/l)

Element	SS-WT-1	SS-CF-MW2	SS-CF-MW3	SS-CF-MW4	SS-CF-MW5	SS-LN-MW6	SS-SS-MW7
Arsenic*	-	-	-	-	-	-	35
Cadmium*	400	4	4	-	5	5	6
Chromium*	18	-	-	-	16	-	32
Nickel*	-	-	-	-	-	66	65
Lead*	9	18	47	20	15	24	41
Selenium*	11	-	-	-	-	-	-
Zinc*	49	54	58	53	54	51	46
Aluminum	530	430	5,200	100	-	-	7,800
Manganese	44	250	5,000	6,500	730	780	21,000
Iron	740	670	11,000	12,000	7,200	1,600	50,000

* Priorty pollutant.

- Material was analyzed for but not detected

Table XVI
Saad Site - Phase III
Water Samples
Purgeable Organic Analysis
(in ug/l)

Compound	SS-(1) WT-1	SS- CF-MW2	SS- CF-MW3	SS- CF-MW4	SS-(1) CF-MW5	SS-(1) LN-MW6	SS- SS-MW7
Vinyl Chloride*	-	-	-	-	-	-	6,600
Chloroethane*	-	-	-	61	-	15	240
Methylene Chloride*			-	-	-	-	19,000
1,1 - Dichloroethene	-	-	-	-	-	-	690
1,1 - Dichloroethane*	-	-	-	67	-	21	1,100
Trans-1,2-Dichloroethene	-	-	-	10 J	-	-	95,000
Chloroform*	74	-	-	-	-	-	11
1,2-Dichloroethane*	-	-	-		-	-	31
1,1,1-Trichloroethane*	-	-	-	-	-	69	15,000
Bromodichloromethane	10	-		-	-	-	-
Trichloroethene	-	-	-	-	-	240	69,000
Benzene*	-	-	-	-	-	10 J	67
Tetrachloroethene	-	-	-	-	-	-	49,000
Toluene*	-	-	-	-	-	10 J	3,900
Chlorobenzene*	-	-	-	-	-	-	87
Ethyl Benzene*							

Table XVI (continued)
Saad Site - Phase III
Water Samples
Purgeable Organic Analysis
(in ug/l)

Compound	SS-(1) WT-1	SS-CF-MW2	SS-CF-MW3	SS-CF-MW4	SS-(1) CF-MW5	SS-(1) LN-MW6	SS-SS-MW7
Acetone	NQ	-	-	NQ	-	NQ	NQ
Methylcyclohexane	-	NQ	-	NQ	-	NQ	NQ
Dichloroflouromethane	-	-	-	NQ	-	-	-
Cyclohexane	-	-	-	NQ	-	-	-
Dimethylheptadienyne	-	-	-	-	-	-	NQ
Hexanone	-	-	-	-	-	-	NQ
Propylheptanol	-	-	-	-	-	-	NQ
Methylheptane	-	-	-	-	-	-	NQ
Trichloroflouromethane	-	-	-	-	-	-	10 J
Unidentified Compounds(2)	-	-	-	1	-	1	2

- Material was analyzed for but not detected.
* Priority pollutant.
J Estimated value.
NQ Not quantified
(1) Quantity is suspect based on QC data.
(2) Reported in number of compounds detected, not ug/l.

Table XVII
Saad Site - Phase III
Water Samples
Extractable Organic Analysis
(in ug/l)

Compound	SS-WT-1	SS-CF-MW2	SS-(1) CF-MW3	SS-(1) CF-MW4	SS-CF-MW5	SS-LN-MW6	SS-SS-MW7
Phenol*	-	-	-	-	-	-	960
2,4-Dimethylphenol*	-		-	-	-	-	33
4-Chloro-3-Methylphenol	-	-	-	-	-	-	25 J
Trimethylphenol	-	-	-	-	-	-	NQ
Methylethylphenol	-	-	-		-	-	NQ
Phosphonic Acid, Tributyl Ester	-	-	-	-	-	-	NQ
Unidentified Compounds (2)	-	-	9	-	6	-	9

- Material was analyzed for but not detected.
* Priorty pollutant.
NQ Not quantified.
J Estimated value.
(1) Quantity for phenols is suspect based on QC data.
(2) Reported in number of compounds detected; not in ug/l.

Table XIX
Saad Oil Company
Nashville, TN
Field Data

Station	pH (SU)	Temperature C °	Conductivity (umhos)
SS-CW-8W(1)	7.80	28	-
SS-CS-5W (1)	9.47	35	-
SS-S-7-W	5.04	17.5	-
SS-S-3.1-W	5.47	16.6	-
SS-S-6.1-W	4.77	16.2	-
SS-SP4-5-W	5.40	16.1	-
SS-S-2-W	6.36	17.8	-
SS-T-2-W	6.23	17.3	-
SS-BC-W	7.11	17.3	-
SS-PW-1W	7.07	18.8	560
SS-PW-2W	6.51	19.1	450
SS-LN-DL-W	7.52	29.8	-
SS-LN-DS-W	6.81	27.6	-
SS-FB-W	5.5	25.9	-
SS-WT-1	7.45	23.0	-
SS-CF-MW2	7.54	20.0	-
SS-CF-MW3	6.37	23.0	-
SS-CF-MW4	NA	NA	-
SS-CF-MW5	6.95	18.0	-
SS-LN-MW6	6.35	21.0	-
SS-SS-MW7	6.18	19.0	-

NA - Not available
- Measurement not taken.

Table XVIII
Saad Site - Phase III
Nashville, Tennessee
Water Samples
Diesel Fuel Analysis
(in mg/l)(1)

	SS-CF-MW2	SS-CF-MW3	SS-CF-MW4	SS-CF-MW5	SS-LN-MW6	SS-SS-MW7	SS-CF-SP
Diesel Fuel	5u	15u	15u	15u	5u	55(2)	5u

u - material was analyzed for but not detected, number is minimum detection limit.

(1) Gas Chromatographic Method

(2) Oil and Grease by gravimetric analysis - results were 65 mg/L

APPENDIX G

DAILY CHRONOLOGY OF FIELD ACTIVITIES

TABLE 4
DAILY CHRONOLOGY OF FIELD ACTIVITIES

DATE	ACTIVITY
March 17, Tuesday	Health & Safety Meeting Begin Tank Sampling
March 18, Wednesday	Finish Tank Sampling Borehole 4 Borehole 14 Borehole 15 Borehole 16
March 19, Thursday	Borehole 1 Borehole 2 Borehole 3 Borehole 17 Borehole 18
March 20, Friday	Borehole 5 Borehole 6 Borehole 19 Borehole 20 Survey
March 21, Saturday	Borehole 7 Borehole 8 Borehole 9 Borehole 10 Borehole 12 Survey
March 22, Sunday	Borehole 11 Borehole 21 Survey
March 23, Monday	Collect Water Samples Redrill B-17, B-19, B-21
March 24, Tuesday	Borehole 13 Collect Water Sample Install Monitoring Well at B-18
March 25, Wednesday	Collect Water Sample Install Monitoring Well at B-11 Skimmer Test B-11
March 26, Thursday	Finish Survey Install Monitoring Well at B-14 Finish Water Sample Collection Redrill B-7
March 27, Friday	Site Clean-up